Rock Products

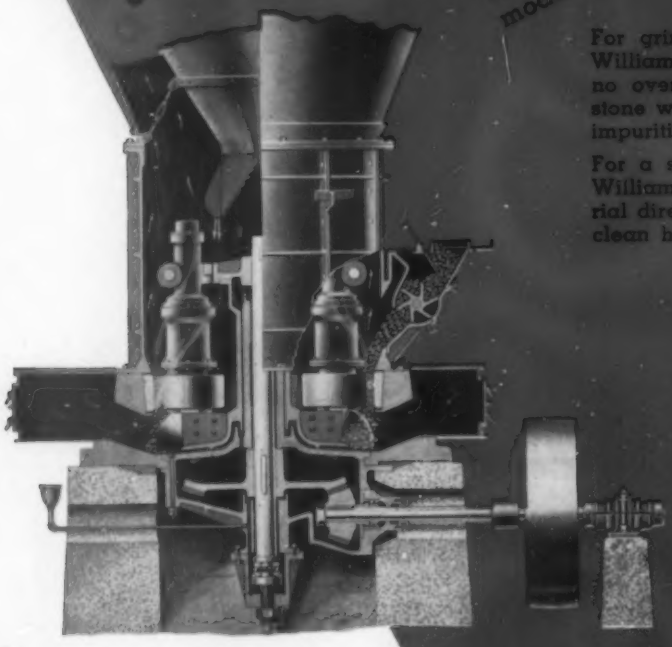
THE INDUSTRY'S RECOGNIZED AUTHORITY

MAY, 1940

Williams

Fine Grinding Equipment for all Branches of the LIME INDUSTRY

Contemplating Improvements? — then investigate the Williams complete line of Lime Plant crushing, pulverizing and air separating equipment — successfully operating in a large number of today's modern lime plants.



Sectional view above of the Williams Improved Roller Mill, photo below shows operator producing agricultural limestone with Williams Mill.

HYDRATED LIME

For grinding hydrated lime to 400 mesh — the Williams Impact Mill. Permits perfect sizing with no oversize — eliminates cores and unburned stone with minimum of hydrate rejected with the impurities.

For a super-high grade chemical hydrate — the Williams Mechanical Air Separator. Takes material directly from the hydrator and separates the clean hydrate from the impurities.

BURNED LIME

For finenesses ranging from 98% — 200 mesh to 99%—325 mesh—the Williams Roller Mill with Spinner Air Separater. No clogging of separator — impurities spouted out or reground to same fineness as the lime.

AGRICULTURAL LIMESTONE

The Williams "Slugger" Crusher will handle quarry run rock and reduce to agricultural limestone in one operation —seven sizes—30 to 150 horsepower.

Williams Patent Crusher & Pulverizer Company

800 St. Louis Ave. St. Louis, Mo.

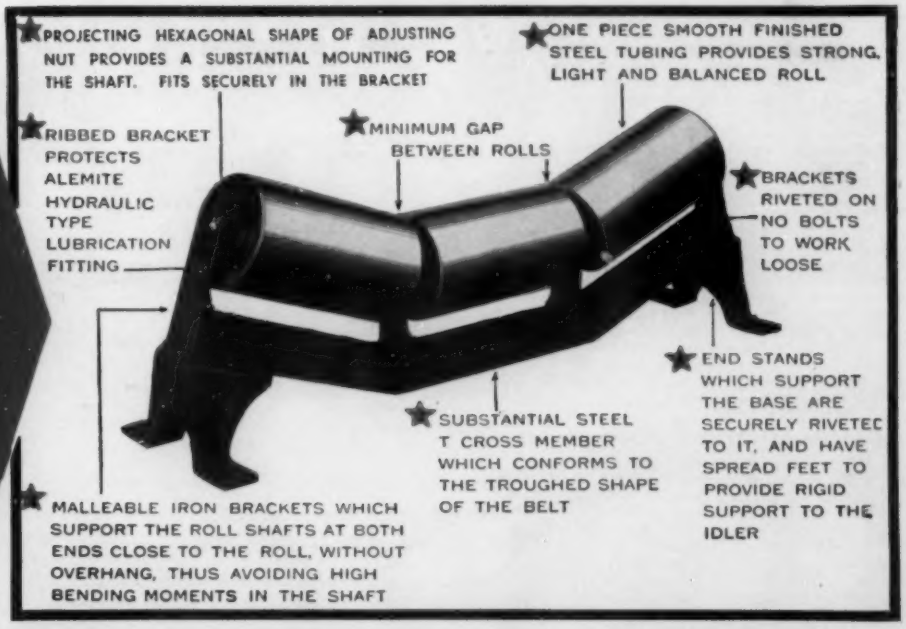
REG. U.S. PAT. OFF.

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

WILLIAMS

PATENT CRUSHERS GRINDERS SHREDDERS

THIS *is where* BELT CONVEYOR ECONOMY *Begins!*



30" wide anti-friction belt conveyor handling 400 tons of minus 1" gold ore per hour, working 16 hours per day, or at the rate of 6000 tons per day—half of this volume being a circulating load. The tripper is of all-steel construction, completely automatic, electrically controlled.

• Dependability in a belt conveyor installation rests principally with the troughing and return idlers. They are the heart of the equipment—the "roadbed" for the belt.

Link-Belt engineers pioneered in the development of anti-friction belt conveyor idlers, with bearings enclosed within the roll, operating in a grease reservoir and protected from grit and dirt by labyrinth grease seals. They have constantly developed this fundamental design — improved the grease seal, bearing adjustment, shaft mounting and other parts.

Handles Many Materials

Today, Link-Belt designs offer the best in belt conveyor equipment for handling a wide range of materials at high and low capacities, with low power and maintenance cost and maximum belt life. These are reasons why you read of so many case histories of Link-Belt belt conveyor economy.

A Complete Line

Link-Belt makes a complete line of anti-friction idlers, with steel rolls, for light, medium, and heavy duty, as well as of cast iron, brass and other metals, to meet specific conditions.

New Developments

A more recent Link-Belt development is the positive self-aligning idler for automatically maintaining the proper position of the belt, without injury to its edges. We also make rubber-covered conveyor rolls for heavy-duty service at loading points, and a self-guiding belt conveyor system which occupies minimum headroom, yet embodies all features for positive belt alignment.

Engineering Service

Get information now on better belt conveyor equipment—whether for modernization or new installation needs. Write to our nearest office.

LINK-BELT COMPANY, *Plants at* Chicago, Indianapolis, Philadelphia, Atlanta, Dallas, San Francisco, Toronto. Offices and warehouses in principal cities. 8188

LINK-BELT

A TYPE FOR EVERY SERVICE

BELT CONVEYOR EQUIPMENT

IDLERS • TRIPPERS • BELTS • PULLEYS • BEARINGS • TAKE-UPS • DRIVES

ROCK PRODUCTS

RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

With which has been consolidated the journals *Cement and Engineering News* (founded 1896) and *Concrete Products* (established 1918)

VOL. 43, No. 5

NEXT MONTH'S ISSUE

In the June issue important articles on research and processing will continue. One of the articles will give the inside on the grinding of clinker as done by a prominent cement company, based on years of experience with closed-circuit grinding which have stabilized operations at this plant. Another will deal with quarry haulage by modern trucking equipment in an outstanding stone plant. Mr. Nettleton will discuss the practical value of testing for companies producing aggregates. Comments and contributions by prominent engineers to the Shaw series will take the place of the regular installment on sand classification. A. J. R. Curtis will continue his article on preventing fires in rock products plants.

Portland Cement

The plant featured this month has adopted a system for grinding clinker that has proved satisfactory for all types of cements, over a period of years. It's a flexible system, with and without air separation, and offers some ideas that work in controlling circulating loads. In open circuit grinding, resetting an indicator to a predetermined point which changes the speed of the screw feeder is the means of control. Cement pumps are used exclusively for handling cement and tailings. A second article tells how a southern plant converted a rock drier from natural gas to coal and utilized the same pulverizers that handle coal for the kilns.

Sand Production

The highly efficient system of producing sand to accurate gradation at Grand Coulee dam has been put to work with similar results in a 50-ton per hour plant described in this issue. Asphalt sand is the principal product made by splitting into fractions and recombining in controlled amounts.

Concrete Products

High pressure steam curing of concrete products, one of the most talked of subjects in the industry today, will be discussed in an illustrated article describing how it is done in two southern plants. Small ready-mixed concrete plants in the south will be treated collectively in a second article, to illustrate how small scale operations, which dominate the industry in numbers, do their job efficiently.

Rock and Gravel

Reinforced concrete was used for the columns, bins and superstructure over the bins in the plant described. Practically all moving equipment is cable-suspended to eliminate shock and vibration. This producer believes in using the materials that he wants to sell for construction of his own buildings.

Chemist Corner

Steven Gottlieb, cement chemist, continues his study on the effect of adding fluxes in the raw material mix. Of particular interest is his discussion of results obtained in the operation of shaft kilns where briquettes are the feed.

Contents for May, 1940

Departments

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Authentic facts relating to editorial scope and reader ship analysis. → ABP

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Speedy Turnover
FOR THE STOCK PILE

SHOVELS
DRAGLINES
CLAMSHELLS
PULL-SHOVELS
CRANES
WALKERS

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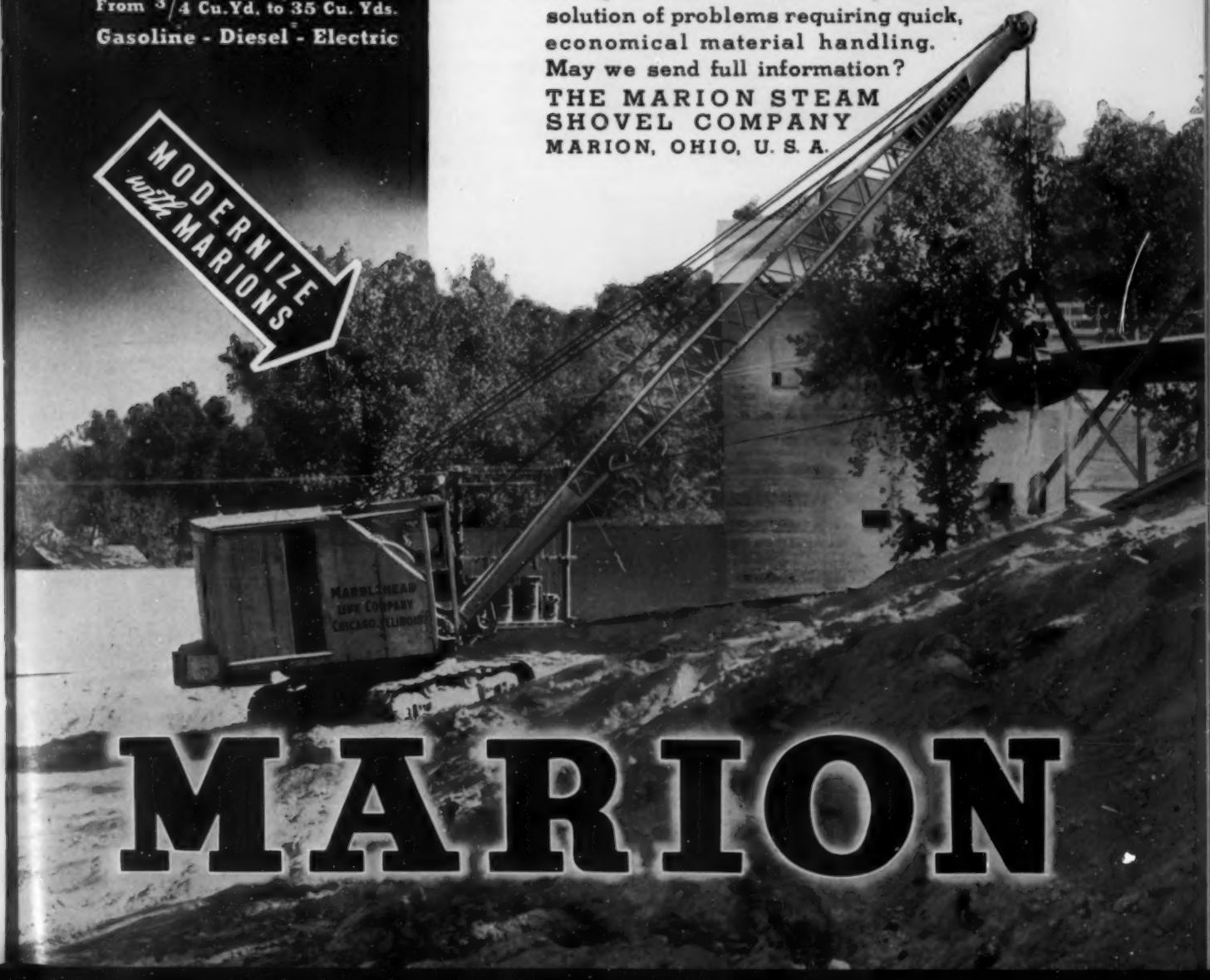
From 3/4 Cu.Yd. to 35 Cu. Yds.
Gasoline - Diesel - Electric

A MARION Clamshell does the trick for Marblehead Lime Company . . . .

The speed and mobility of this Marion Type 331-3/4 cu. yd. clamshell are decided assets to the Marblehead Lime Co., Hannibal, Mo. Operating as clamshell, crane, and shovel, it is not only used in the stock yard for moving and unloading agricultural limestone, but is also employed to advantage on various excavating and erecting projects. Marion's adaptability to varied needs is a profitable solution of problems requiring quick, economical material handling. May we send full information?

THE MARION STEAM SHOVEL COMPANY
MARION, OHIO, U. S. A.

MODERNIZE with MARIONS



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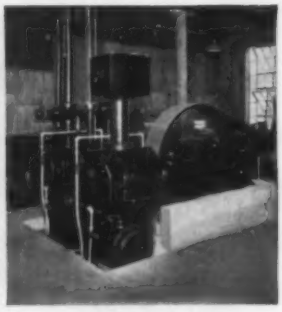
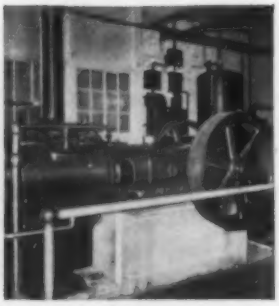
KEEPS VALVES WORKING

EXCAVATING



QUARRYING

ROAD WORK



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GOLD MINE

SEWER JOB

POWER HOUSE

GLASS WORKS

Regardless of... MAKE, SIZE, SERVICE!

LET THESE PICTURES suggest that it might be profitable for you, also, to look to your air compressor lubrication.

Operators in all these fields are daily proving that they can keep their air compressors at top efficiency with less cost . . . by lubricating with *Texaco Alcaid, Algol or Ursa Oils.*

When you turn to Texaco, it is very possible that such benefits as: cleaner valves and ports, less maintenance, repairs, and replacements, more pressure with less power, will promptly result.

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TEXACO

REG. T.M.

TEXACO

ALCAID, ALGOL AND URSA OILS

Simple Yet Effective Performance —*At Least* One Hundred Million Times!

Atlas **ACCORDION FOLD** Electric Blasting Caps

ATLAS ACCORDION Fold Electric Blasting Caps have been used at least one hundred million times! That's a lot of shots in any language—and it speaks volumes in proving the advantages of the Accordion Fold package.

The cap is packed in the center of forty-eight folds of wire (held securely by the heavy paper tube) to protect the detonator. Yet the complete package is the last word in compactness and convenience, as well as safety!

The Atlas Accordion Fold individual package is handy to carry—easy to open—a slight pressure of the fingers "does the trick." Wires extend easily and naturally into position without kink or snarl. Cap end is easily straightened out for priming without disturbing the rest of the accordion fold.

For the easiest, simplest, safest method of handling electric blasting . . . ask the Atlas Representative about Atlas Manasite Electric Blasting Caps in the Accordion Fold package.

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Everything for Blasting

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ATLAS EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

Drilling in Carlton Tunnel done from this four-drill Jumbo. The Jumbo carries a complete round of steel and TIMKEN Bits eliminating need for hollow drill steel car.

TIMKEN* BITS SAVE $1.00 PER FOOT ON THIS 6 MILE TUNNEL JOB . . . . .

TRADE-MARK REG. U.S. PAT. OFF.

What an assignment—tunneling a six mile hole, ten by eleven feet in section, through hard granite and aplite—both containing a high percentage of quartz! Yet, this assignment is being carried out at the rate of about 1,500 feet per month by the Golden Cycle Corporation on its Carlton Tunnel Project at Cripple Creek, Colorado! When completed the tunnel will lower the present water level 1,100 feet and thereby make workable a large area of rich ore.

TIMKEN Rock Bits were brought in on the job after two months of tunneling. Immediately drilling speed went up and drilling costs came down—*down to a saving of $1.00 per foot!*

The details that tell the story of TIMKEN Rock Bits performance and savings on the Carlton Tunnel project are too numerous to list here but we will welcome an opportunity to discuss them with you and also show what TIMKEN Bits will do on your job. Write us right now.

*TRADE-MARK REG. U. S. PAT. OFF.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

HOW DOES THIS STRIKE YOU?

63 Tons to 3/8 in. at 59 HP.!

WITH A 3'-0" MACHINE WORKING ON TRAP ROCK

CUBICAL PRODUCT — FEW SLABS OR WASTE FINES

this is routine performance of our new

NON-CHOKABLE
MULTI-STAGE FINE REDUCTION CRUSHER

The crusher that always delivers exactly what operators need, and eliminates the troubles they have had with fine reduction machines, because—

It is non-chokable in either stage, because both are independently adjustable to exactly suit individual requirements.

It delivers more product per horsepower consumed than is usually obtained from reduction crushers.

It discourages any tendency of rock to crush into flats, due to the gradual ratios of reduction, and, by this token, the product is more cubical than usually obtained in making very small sizes.

It has provisions to minimize breakage of parts generally experienced with fine reduction crushers, and to empty the machine in case of sudden power failure.

You'll profit by investigating this crusher. Have our representative in for a talk-it-over, or at least, be sure to send for Bulletin 113. While you're at it get our Bulletins 2112 (TY Crusher) and 105 (Type H Jaw Crusher). They'll interest you too!

WE BUILD

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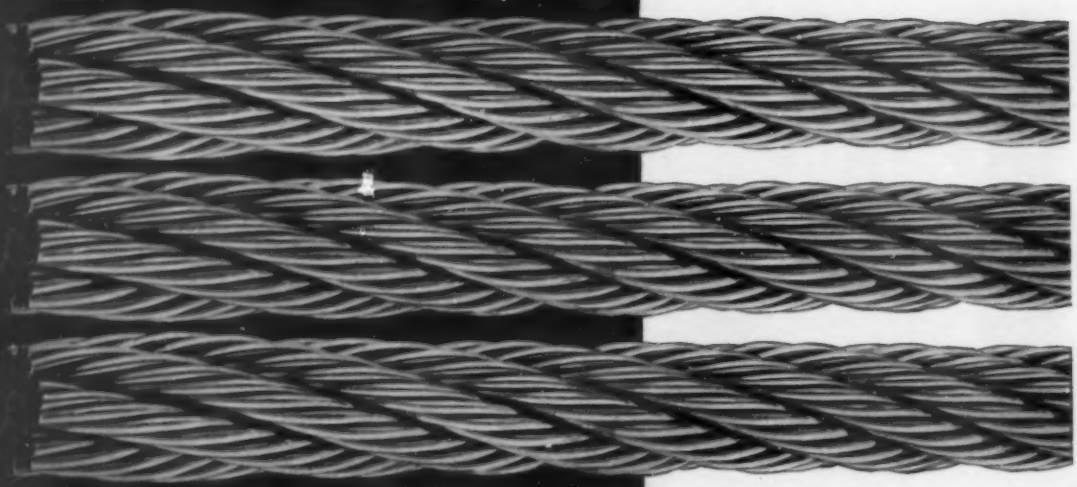
Exactly alike?



Not a bit of it . . .

TELFAX TELLS YOU WHY

Because wire ropes of the same size all look alike, examination tells you nothing about their grade. In fact, in the case of ordinary ropes, it takes a laboratory test to tell the difference between, say, Cast Steel and Plow Steel—although there is a difference, in the ¾-in. size, of 36 per cent in list price and nearly four tons in strength.

But Bethlehem Wire Ropes are easy to identify, and without laboratory tests. The exclusive Telfax Tape is built into each foot of Bethlehem Rope. Laid next to the core, this continuous marker is your certificate for instant identification of the grade and quality of every new Bethlehem Rope.

Telfax is a positive protection against mistakes that may lead to damage, or even loss of life. It makes no difference whether the rope has been re-reeled, whether it comes to you in cut lengths, or whether tags and markings have been lost. The identification, built in when the rope was made, is still with the rope: you can quickly and easily check up on the grade. Play safe with Telfax.

This cellophane marker identifies the grade of all Bethlehem wire rope. The name is printed on it, and color gives further identification: purple = Purple Strand; green = Plow Steel; red = Cast Steel, etc.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

Too Tough?

NOT FOR A FORD TRUCK!

● When the going gets really tough, put a Ford Truck on the job and watch it perform. These big, rugged units are built to take hard work — and like it! They're trucks, every inch of them, with big, massive frames, axles, springs, brakes.

Power? Smooth, dependable, eight-cylinder power with a choice of three efficient truck engines — 95, 85 and 60 hp.

And economy! From the Model T to today's giants, the Ford Truck has showed the way to real dollar-saving performance. It gets to the place it's going in a hurry and is back for more payload and more trips per day.

From the toughest to the smallest hauling and delivery job there's a Ford Truck to give you this kind of economy. There are six wheelbases, forty-two body and chassis types, and a wide choice of special equipment, including optional axles, transmissions and larger tires.

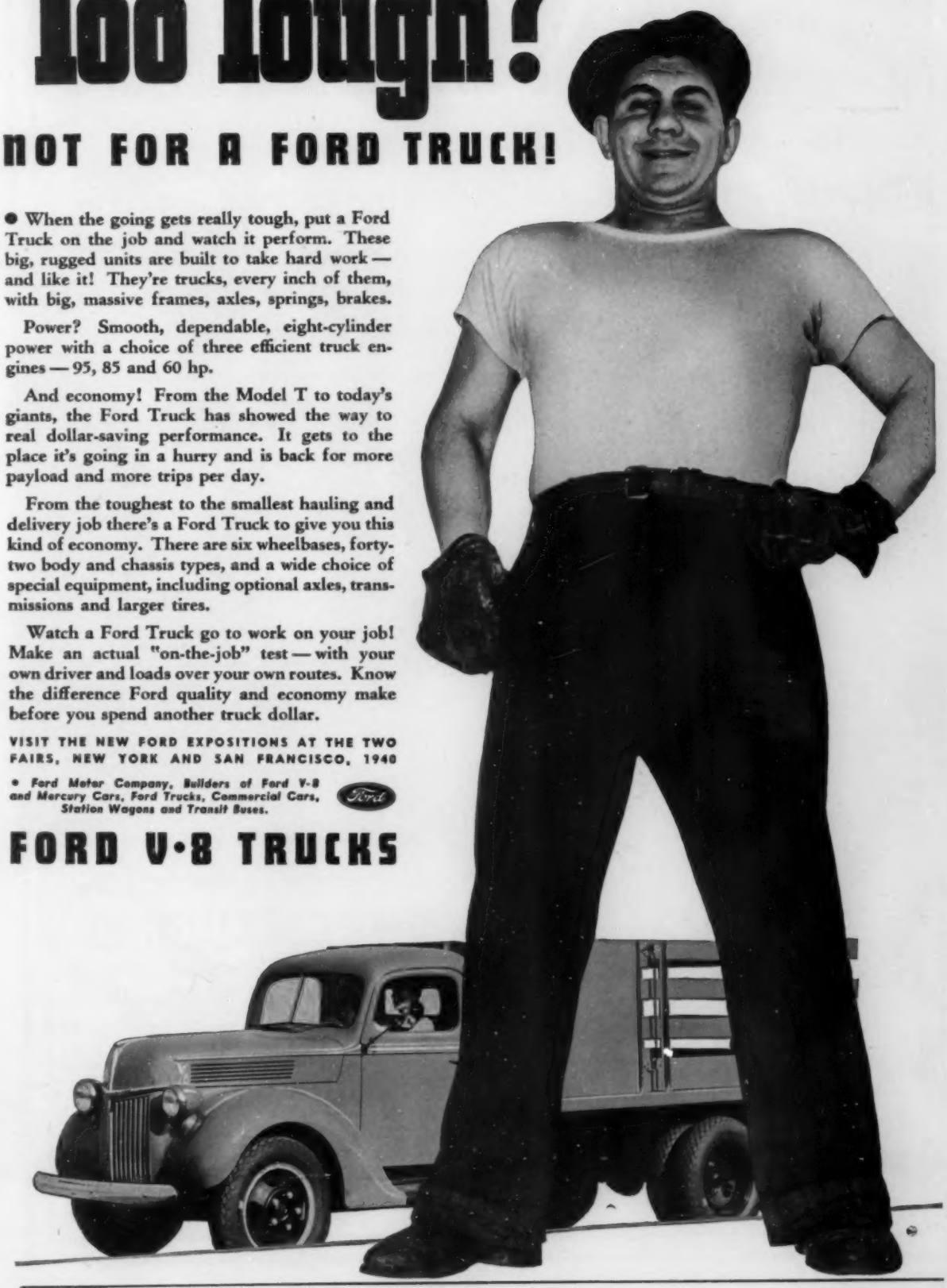
Watch a Ford Truck go to work on your job! Make an actual "on-the-job" test — with your own driver and loads over your own routes. Know the difference Ford quality and economy make before you spend another truck dollar.

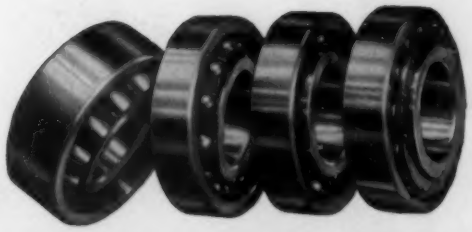
VISIT THE NEW FORD EXPOSITIONS AT THE TWO FAIRS, NEW YORK AND SAN FRANCISCO, 1940

● *Ford Motor Company, Builders of Ford V-8 and Mercury Cars, Ford Trucks, Commercial Cars, Station Wagons and Transit Buses.*

Ford

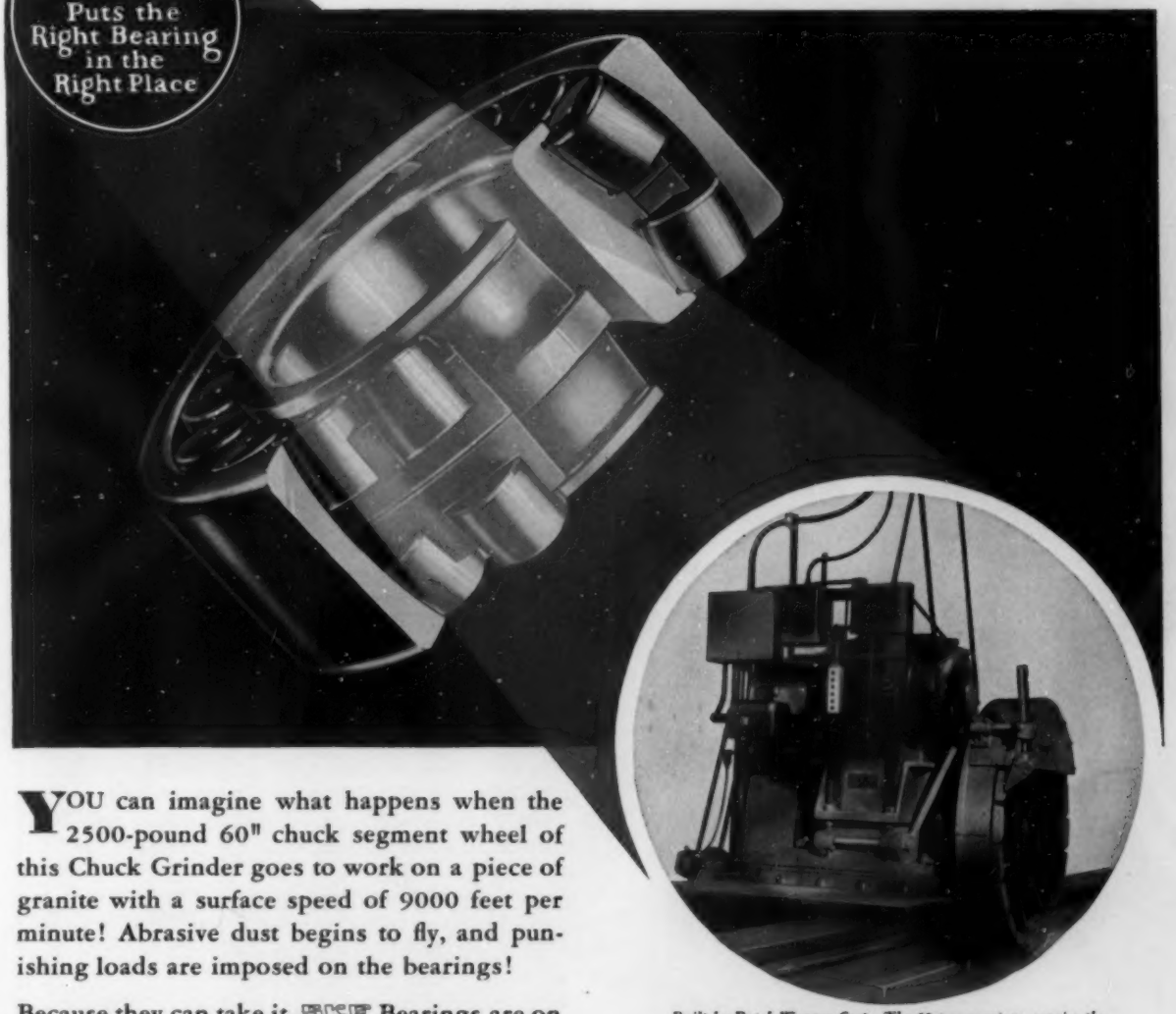
FORD V·8 TRUCKS





WHEN A 2500-LB. WHEEL GRINDS GRANITE WITH A SURFACE SPEED OF 9000 F.P.M. ON SKF'S

SKF
Puts the Right Bearing in the Right Place



YOU can imagine what happens when the 2500-pound 60" chuck segment wheel of this Chuck Grinder goes to work on a piece of granite with a surface speed of 9000 feet per minute! Abrasive dust begins to fly, and punishing loads are imposed on the bearings!

Because they can take it, SKF Bearings are on the spindle, worm reducer and transmission gear shafts. Built like a watch to do the work of a giant, SKF's are the first choice of engineers everywhere for the big brute jobs of industry. Make sure the bearings on *your* machines are SKF's on your next tough job. 4569

Built by Patch-Wegner Corp. The 10-ton carriage carries the operator over a 46-foot bed in a 36-foot grinding capacity. Protected from extraneous matter by SKF Pillow Blocks, SKF Bearings are self-aligning to permit shaft deflections without binding or losing their high capacity.

SKF
BALL & ROLLER BEARINGS

SKF INDUSTRIES, INC., PHILADELPHIA, PA.

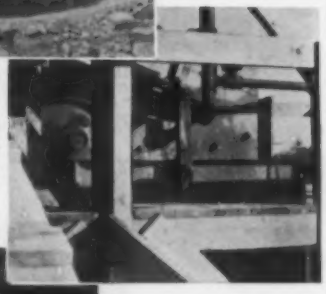
TELSMITH

EQUIPPED GRAVEL PLANT SUCCESSFULLY SERVES

Boston Market

General View Crystal Concrete Products Co. Plant

13-B Telsmith Primary Breaker crushes the large boulders to 3 to 4 inches



4-foot x 12-foot Telsmith Triple Deck Pulsator

8-B Telsmith Gyratory Crusher reduces over size from Primary Breaker

Two of the three Telsmith Sand Tanks

● Supplying the Boston market with sand, gravel, and ready-mixed concrete—this new and completely modern Telsmith-equipped plant of the Crystal Concrete Products Co. at Braintree, Mass., is closer to Boston than any other plant of comparable size.

The plant's principal owner, Mr. Thomas A. Hannaford, is both an experienced and large-scale operator. The use of Telsmith equipment is doubly significant.

The bank covers about 150 acres . . . and the plant is now producing 125 tons an hour of 1½-inch and down. This is not top capacity by any means. Even in its breaking-in period the plant produced considerably more.

The equipment, in its flow sheet order, includes: 24″ Telsmith Plate Feeder; 13-B Telsmith Primary Breaker crushing large boulders to 3 to 4″ size; 30″ x 76′ Steel Frame Main Belt Conveyor; 4′ x 10′ Telsmith Single Deck Pulsator; 8-B Telsmith Gyratory Crusher crushing oversize from the primary breaker; 18″ x 79′ Steel Frame Return Belt Conveyor; 24″ x 129′ Steel Frame Main Belt Conveyor; 4′ x 12′ Telsmith Triple Deck Pulsator; one No. 7 and two No. 8 Telsmith Sand Tanks; four Duplex and three Simplex Telsmith Bin Gates, 15″ x 15″.

Like all Telsmith-equipped plants, the operation of this one has been more than satisfactory from the start. Every individual Telsmith unit does its job, with a minimum of attention and upkeep. The entire ensemble runs smoothly —*and profitably*. Planning a new quarry or gravel plant? Modernizing? *Find out* about Telsmith engineering service and guaranteed results. *Get Bulletin G-11.*

G-5-40

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A NEW 1 YARD SHOVEL by NORTHWEST

Model 41

—*EQUIPPED with all* of these Northwest features — proved in the field, in actual service! Helical Gear Drive, Uniform Pressure Swing Clutches, "feather-touch" Clutch Control, Cushion Clutch, Dual Crowd, Northwest Welded Boom and Dipper Sticks, Ball or Roller Bearings on all high speed shafts, Worm Boom Hoist, Northwest mobility, travel mechanism fully enclosed and running in oil.

—Like all Northwests—a *real* Rock Shovel!

—And when you have a real Rock Shovel you never have to worry about output.

NORTHWEST ENGINEERING COMPANY
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Easily Convertible to CRANE, DRAGLINE or PULLSHOVEL

Like All NORTHWESTS— A Real ROCK SHOVEL

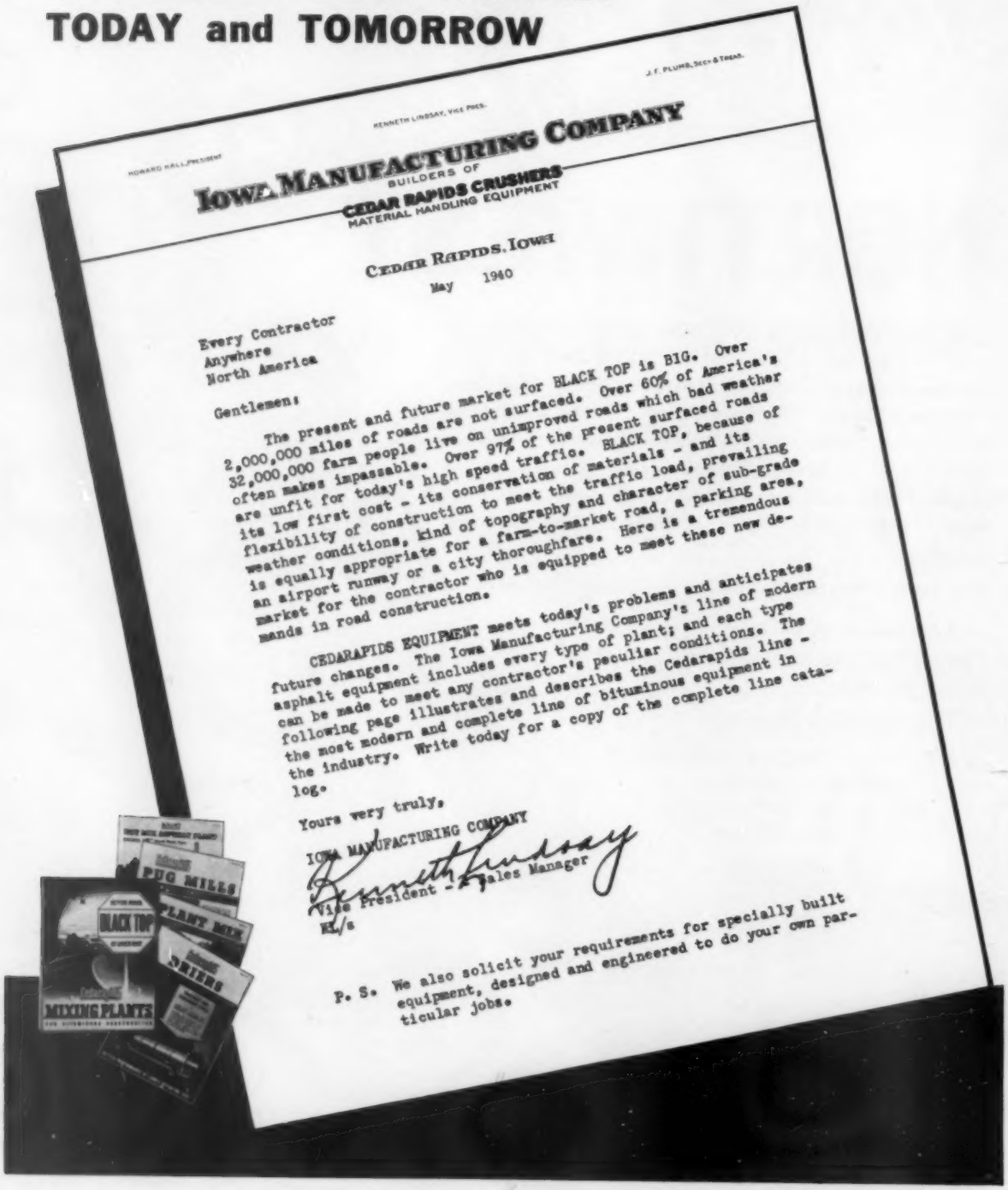
GASOLINE • ELECTRIC • DIESEL • OIL

Built in a range of 18 SIZES 3/8 yd. capacity and Larger

—and when you have a real Rock Shovel you won't have to worry about output

GET READY NOW FOR BIG

. . . HERE'S YOUR MARKET TODAY and TOMORROW



HOWARD HALL, PRESIDENT — KENNETH LINDSAY, VICE PRES. — J. F. PLUMB, SEC'Y & TREAS.

IOWA MANUFACTURING COMPANY
BUILDERS OF
CEDAR RAPIDS CRUSHERS
MATERIAL HANDLING EQUIPMENT

CEDAR RAPIDS, IOWA

May 1940

Every Contractor
Anywhere
North America

Gentlemen:

The present and future market for BLACK TOP is BIG. Over 2,000,000 miles of roads are not surfaced. Over 60% of America's 32,000,000 farm people live on unimproved roads which bad weather often makes impassable. Over 97% of the present surfaced roads are unfit for today's high speed traffic. BLACK TOP, because of its low first cost - its conservation of materials - and its flexibility of construction to meet the traffic load, prevailing weather conditions, kind of topography and character of sub-grade is equally appropriate for a farm-to-market road, a parking area, an airport runway or a city thoroughfare. Here is a tremendous market for the contractor who is equipped to meet these new demands in road construction.

CEDARAPIDS EQUIPMENT meets today's problems and anticipates future changes. The Iowa Manufacturing Company's line of modern asphalt equipment includes every type of plant; and each type can be made to meet any contractor's peculiar conditions. The following page illustrates and describes the Cedarapids line - the most modern and complete line of bituminous equipment in the industry. Write today for a copy of the complete line catalog.

Yours very truly,
IOWA MANUFACTURING COMPANY
Kenneth Lindsay
Vice President - Sales Manager
KL/s

P. S. We also solicit your requirements for specially built equipment, designed and engineered to do your own particular jobs.

BUSINESS IN BLACK TOP

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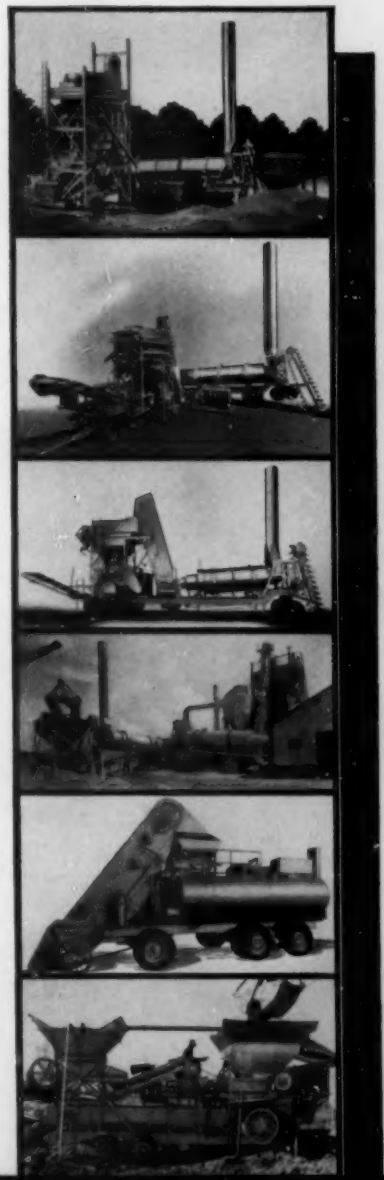
A PLANT FOR EVERY JOB



MODEL "A" KNOCK DOWN TYPE HOT MIX ASPHALT PLANT . . The Cedarapids conventional type of hot mix plant. This model is built to meet individual requirements from standard Cedarapids units. Centralized controls — accurate grading and proportioning — thorough mixing — simplified erection. Available in 2000 lb. — 3000 lb. — 4000 lb. sizes. Bulletin AP-7.

MODEL "B" PORTABLE TWO UNIT HOT MIX PLANT . . Fully portable for quick moves and fast field erection. Portability offers extra cost saving opportunities and reduces time and labor. Has the same accurate controls and thorough mixing and batching features as model "A". For making cold mix, an additional drier unit may be added. Available in 2000 lb. size. Bulletin AP-8.

SPEEDLINE PORTABLE HOT MIX PLANT . . A complete 1000 lb. capacity plant, fully mounted on one truck. Can be taken anywhere with speed and economy — meets highway specifications for transportation — has the same accurate, thorough mixing and batching features of larger plants — will handle work impractical for larger and more expensive equipment. A money saver on small jobs. Makes bituminous construction possible in new fields. Bulletin SP-1.

MODEL "C" HOT OR COLD MIX ASPHALT PLANT, KNOCK DOWN TYPE . . The most efficient and economical stationary asphalt plant in the industry. Built to handle all types of bituminous material. Has drier-cooler combination, making possible either hot or cold mix as desired. A by-pass conveyor from the feeder to the second drier is used for hot mixes. A finely balanced plant for fast, smooth and accurate production that will meet the most rigid specifications. Capacities to suit any requirements. Bulletin AP-10.

TRAVELING ROAD MIX MACHINE . . An accurate — fast — low cost — self contained machine that picks up, mixes and delivers the finished product as it rolls down the road under its own power. Continuous mix type, 17'0" pugmill with renewable NI-HARD mixing paddles and manganese steel liners — accurate batcher and metering pump — 1000 gallon bitumen tank — centralized controls — single power plant — eight wheel drive — equalizing beam rear axle — pneumatic tires — hydraulic brakes. A large capacity, compact, portable plant.

PORTABLE STABILIZER PLANT . . A large capacity, portable plant that produces an accurate mix, proportioning any combination of calcium chloride, cement, oil, gravel, clay or soil and water. As many as three solids and two liquids can be proportioned and mixed together at the same time. Continuous type horizontal pugmill — clay-soil shredder — positive and accurate feeders—metering pumps—individual charging hoppers—mounted on pneumatic tires with equalizing beam assembly or on skids. This plant is simple to set up, easy to move and will produce large tonnage in tough, gummy material with economy. A big money saver. Bulletin STAB-1.

Cedarapids

PORTABLE and STATIONARY

CRUSHING PLANTS — ASPHALT MIXING PLANTS

WASHING PLANTS — MATERIAL HANDLING EQUIPMENT

IOWA MANUFACTURING COMPANY • CEDAR RAPIDS IOWA

Continuous Modern i
the Cement Indu s
Business for YOU

The cement industry is one of the best equipment markets any manufacturer would want. Modernization goes on continuously, month after month, year after year, with little seasonal fluctuation.

This industry wears out machinery faster than any other — the equipment is subjected to highly abrasive operating conditions as well as to intense heat. Because of this frequency of replacement the plant operators are constantly looking for equipment which will be more economical.

Here is an excellent picture of the variety of equipment which the cement industry is going to buy based on 324 requests for manufacturers' catalogs received from cement plants in the United States and 14 foreign countries scattered on every continent:

- Alloy Steel
- Bearings
- Belting and Accessories
- Block Machines
- Calcium Chloride
- Conveying Equipment
- Crushers
- Diesel Engines
- Drills
- Dust Collectors
- Electrical Equipment
- Electrical Control Equipment
- Engines
- Explosives
- Feeders
- Fine Grinding Equipment
- Haulage System
- Locomotives
- Lubricants
- Oil Reclaimer
- Packing & Weighing Equipment
- Portable Concrete Plants
- Pumps
- Refractories
- Rubber Products
- Safety Equipment
- Screening Equipment
- Shovels, Cranes, Draglines, Excavators
- Speed Regulators
- Testing & Recording Equipment
- Tractors
- Welding
- Wire Rope

Month after month ROCK PRODUCTS publishes stories of outstanding modernization activities which cement plants have completed or are planning. Remember the smash hit of the August, 1939, Cement Number of ROCK PRODUCTS?

ization Program of stry Means More

★ ★ ★ ★ ★ ★ ★

The August 1940 Cement Number will be

completely NEW
entirely DIFFERENT

The only thing which will be the same is the complete editorial coverage of the Cement Industry. The latest developments in every branch of the industry will be discussed.

The August Cement Issue will do the same kind of complete job from an advertising angle and from a circulation angle. We will present to every cement plant in the United States and most foreign countries advertising of every conceivable type of machinery, equipment and supplies required in the every day operation of the different divisions of the industry.

Make your plans now to tie in your advertising program with ROCK PRODUCTS' greatest cement issue. Special sepia stock available at no extra cost. Regular rates prevail throughout. First forms close July 20 but make your reservation now for choice position.

Send for a copy of the 1939 Cement Issue and see for yourself why ROCK PRODUCTS is the world's greatest cement paper and its most powerful advertising medium.

ROCK PRODUCTS

309 West Jackson Boulevard
Chicago, Illinois

FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER

Was out on a job with Mr. Long this A.M. when I came across a wire rope that was badly in need of lubrication. "Look out for trouble here," I told him, "this rope's as dry as a bone."

He looked it over. "Looks okay to me," he said, "not much wear."

"That's just the point," I told him. "You can't see what goes on inside a rope. When it's not lubricated, the external appearance may deceive you. The inside wires may be badly worn and corroded and even broken from abrasion and binding."

"Better give that rope a good dose of lubricant if you want to save it."

Yours,
Al

USS
EXCELLAY
Preformed
WIRE ROPE

BY keeping your wire ropes properly lubricated, you save money two ways: You protect the rope from premature failure; and you reduce friction.

Proper lubrication is an effective deterrent to corrosion. It protects both inside and outside wires against destructive rusting. It keeps all wires free to slide over each other, as they must do when the rope bends over sheaves and drums. It minimizes friction and wear between individual wires, and between the rope and sheaves or guides through which it passes. It is the safest, surest method of preventing excessive wear inside the rope, where you can't see it.

See that all wire ropes are properly lubricated at regular intervals. Insure greater safety—prolong rope life—reduce lost time—get the benefits of fewer replacements. For specific recommendations on wire rope lubricants and lubrication practice, see the Tiger Brand Wire Rope Engineer who contacts you.

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
San Francisco
United States Steel Export Company, New York

UNITED STATES STEEL

LIMESTONE and LIME PRODUCTS

RAYMOND METHODS CUT YOUR COSTS

Raymond Roller Mill with whizzer separator, pulverizing agricultural limestone

Raymond Automatic Pulverizer with whizzer separator, producing hydrated lime

LIMESTONE AND QUICKLIME

Produced at new low cost per ton by the latest type of whizzer-equipped Raymond Roller Mill.

It pulverizes, classifies and conveys the product in an enclosed, dustless system to storage by one continuous operation.

Ideal for grinding limestone to uniform fineness in making fillers and fertilizers.

Any grade of quicklime readily obtained, from 50 to 200 mesh material, simply by changing speed of whizzer. Write for Catalog.

SUPERFINE HYDRATED LIME

Economically made to maximum specifications of high purity hydrated lime by whizzer-equipped Raymond Automatic Pulverizer with throw-out attachment.

Takes feed from hydrate bin, disintegrates and classifies material, rejecting impurities by throw-out device and delivering finished product at finenesses up to 99.5% minus 400-mesh.

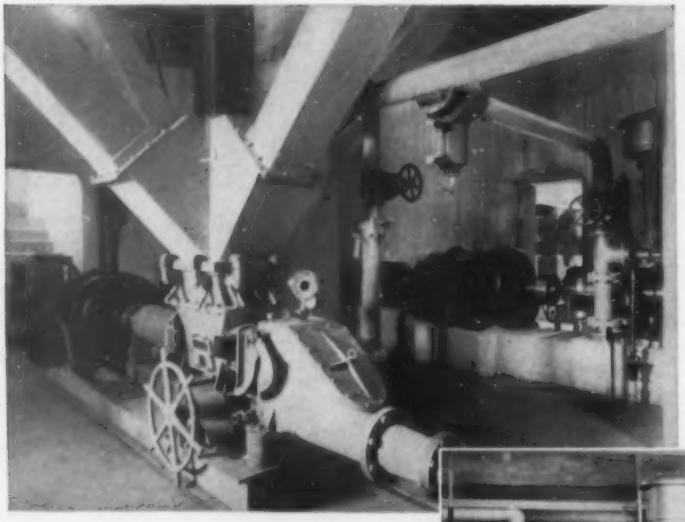
Raymond also builds new double whizzer type Mechanical Air Separator . . . and Bowl Mill for direct firing rotary lime kilns. Ask for Catalogs.

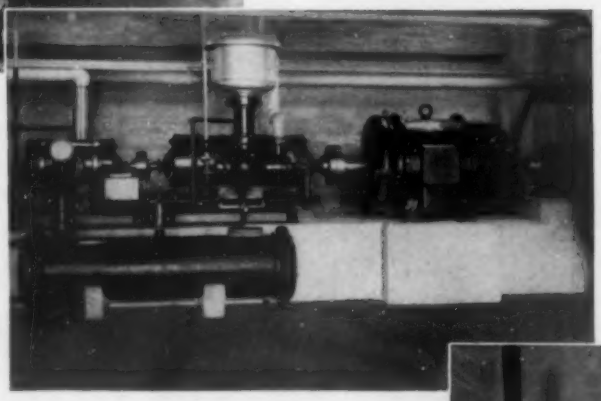
RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1307 North Branch Street CHICAGO
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

Another FULLER-KINYON PUMP

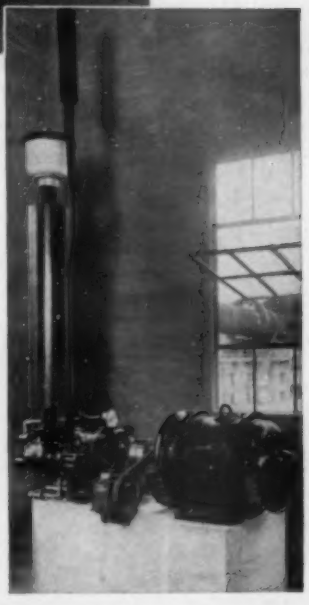
AND

FULLER ROTARY COMPRESSOR INSTALLATION





Above—Fuller-Kinyon Portable Cement Pump for conveying cement from silos to packer bins. Fuller Rotary Single-stage Compressor in background, furnishing air for Fuller-Kinyon Pump. Right—Fuller Rotary Two-stage Compressor furnishing air for Fluxo Conveying System. Lower right—Fuller Rotary Single-stage Compressor, furnishing air for slurry agitation.



ANOTHER Fuller installation, thousands of miles away, attesting to the confidence placed in this equipment to give lasting, trouble-free service and continuous performance day in and day out. In this modern, up-to-date cement plant in South America, Fuller equipment was selected and installed, as follows:

Two 7" Type H Fuller-Kinyon Portable Pumps; conveying cement from silos to packer bins. Also for recirculating.

Two 4" Type H Fuller-Kinyon Stationary Pumps; conveying packer spill to packer bins.

One Two-Stage Fuller Rotary Compressor; air for Fluxo Conveying System.

One Single-Stage Fuller Rotary Compressor; air for slurry agitation.

Two Single-Stage Fuller Rotary Compressors; air for Fuller-Kinyon Pumps.

Of course, Fuller-Kinyon Pumps have long been accepted as standard practice in the cement industry; and now, more and more Fuller Rotary Compressors, due to their inherent characteristics and advantages, are being installed in cement and other industrial plants.

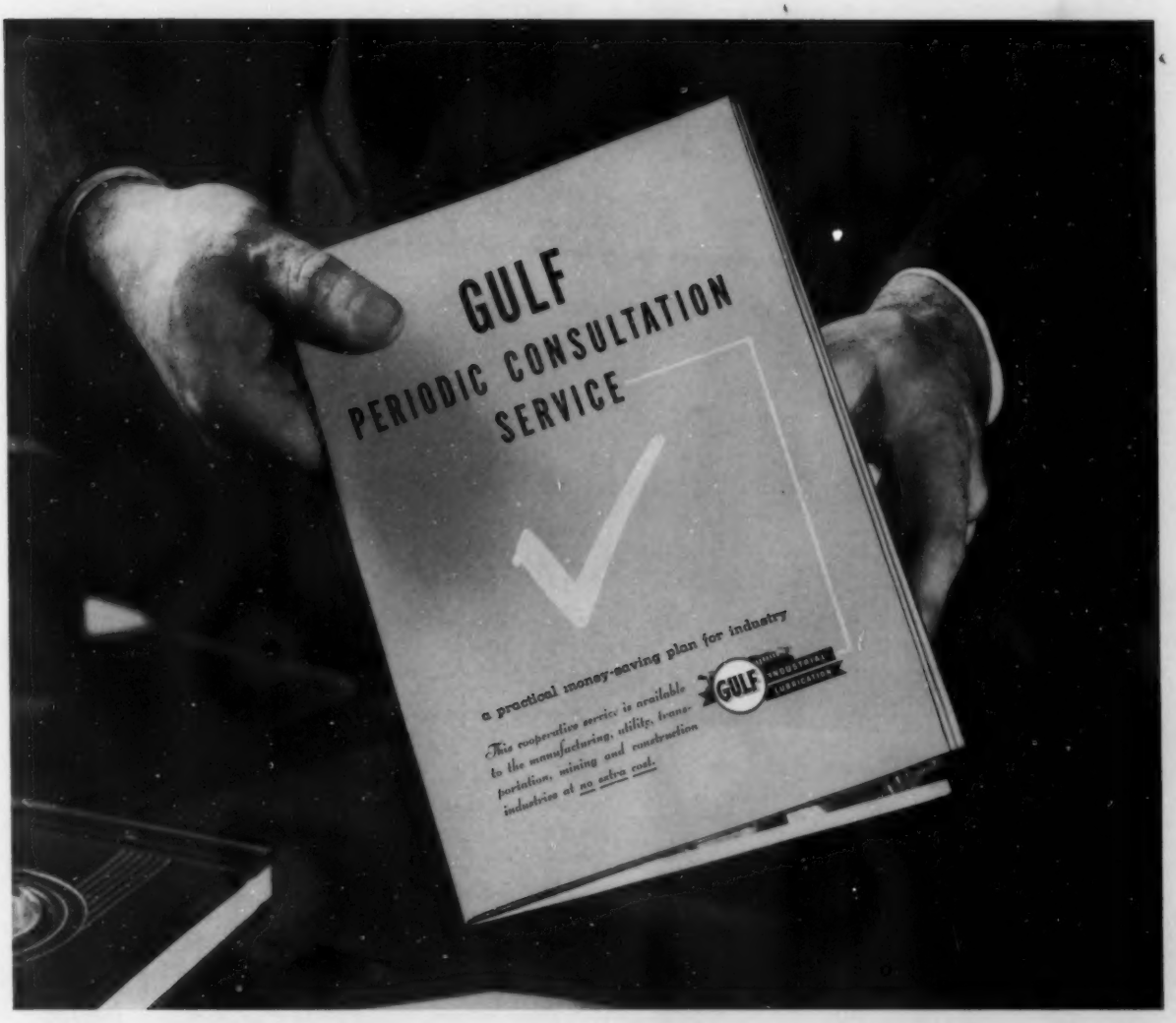
FULLER COMPANY

CATASAUQUA, PENNSYLVANIA

Chicago: Marquette Bldg. **San Francisco: Chancery Bldg.**

G-15

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · · AIR-QUENCHING COOLERS · · · · BIN SIGNALS



The "Booklet-of-the-Month"

FOR OPERATING OFFICIALS AND ENGINEERS

HERE is news for cost-conscious executives who are harassed by higher "non-controllables." With costs up and profits in the squeeze, operating men are welcoming this practical plan which they can put to work *immediately* to reduce the "controllables."

You agree, of course, that lubrication has a lot to do with the efficiency of your production and the cost of maintaining your equipment. *Now* you can use this modern method to establish a scientific lubrication procedure which will insure higher efficiency and lower costs for the maintenance and operation of your machinery.

For the operating executive who is seeking a means to increase manufacturing efficiency and profits, here is a *practical* plan through which *immediate action* can be taken! Write for your free copy of the booklet which explains this money-saving service to you.

GULF INDUSTRIAL LUBRICATION

With this advanced Lubrication Service, you can meet today's pressing need for Operating Economies. Write for your free copy of the booklet.

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Please send my copy—no charge—of the booklet "GULF PERIODIC CONSULTATION SERVICE."

Name.....

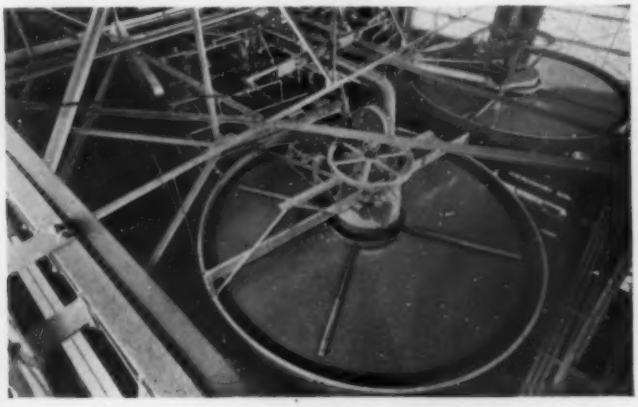
Company.....

Address.....

The DORR C.C.G. SYSTEM
FOR BETTER WET PROCESS CEMENT GRINDING

ADVANTAGES OF DORR C. C. G. . . .

- Less Power for Raw Grinding
- Less Consumption Balls and Mill Liners
- More capacity per mill
- No coarse, stray oversize in slurry
- More uniform slurry—chemically and physically



Wet grinding mills in closed circuit with Dorr Bowl Classifiers

Dorr Thickener concentrating Classifier overflow to slurry density

Dorr Slurry Mixers ahead of rotary kilns

★ During the last few years, wet process cement manufacture has made great strides—has generally improved practice—has re-equipped to meet the new and stricter specifications demanded by consumers.

The Dorr C.C.G. System has been adopted by the two newest wet process mills, as well as six others built over the last ten years. First step in the Dorr System is two-stage closed circuit grinding with Dorr Classifiers, then slurry thickening in Dorr Thickeners and finally, slurry correction in Dorr Slurry Mixers. All of these Dorr units have been developed especially for this field.

The Dorr System not only helps to give a better finished product but pays for itself in a few years out of power and other savings. One of our most recent 4000 barrel installations requires only 3.58 Kw. hrs. per barrel for grinding from 1 in. to 90% minus 200 mesh—about half the average for the industry.

If you are about to build a new wet process mill, modernize an old one or shift from dry to wet processing, you can't afford to overlook the Dorr System. Better call in a Dorr engineer now for a fact-finding conference.

● *Complete technical report on Dorr C.C.G. with operating data and cost analysis, available on request.*

DORRCO

THE DORR COMPANY INC.

ENGINEERS • 570 Lexington Ave., New York

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DORR TECHNICAL SERVICES AND EQUIPMENT ARE AVAILABLE FROM THE FOLLOWING COMPANIES:

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AUSTRALIA: Crossle & Duffy Pty. Ltd., Melbourne.
SOUTH AFRICA: Edward L. Bateman Pty. Ltd., Johannesburg
JAPAN: Andrews & George Co. Inc., Tokio
ARGENTINA: Luis Fiore, Buenos Aires
BRAZIL: Oscar Taves & Co., Rio de Janeiro

MONARCH OF THE MINERAL KINGDOM

We have often longed for leisure to write a popular book, entitled let us say, "The Monarch of the Mineral Kingdom." And what might that be, you ask. No, not coal, iron or petroleum that are sure to occur to the average mind as essential to civilization. Man lived on earth a good many epochs before he learned to make any use of these now "essential" minerals. He could if necessary live so again—and very possibly more peacefully. Believe it or not, the one mineral he could not do without is *limestone*—essentially calcium carbonate ($CaCO_3$) in chemical terms.

Why do we make that seemingly extravagant statement? Partly, we must admit, because the whole subject of limestones and their uses and their products and by-products has fascinated us for the last quarter century. But the real basis for such a claim for limestone is the simple fact that but for its presence on this planet you and we just wouldn't be here at all. It was the presence of dissolved calcium and magnesium carbonates in the waters of the earth that made possible the evolution of the first Protozoa or single-celled animals with calcium carbonate coatings or shells. From these in the course of millions of years evolved the Mollusca (shell fish), the Arthropoda (crabs, lobsters, etc.) and eventually the Vertebrata, or animals with inside backbones, of which man is classed as the acme, or at least he was entitled to be so classed until the outbreak of the most recent World War. The point is that without backbones, and skulls to hold our brains, we would still be marine worms or jelly fish; and it was God's will and the limestone in nature's soil that converted the ancient worms and jelly fish to the 1940 human masters of this earthly planet!

Just as limestone was essential to our evolution from the jelly fish, so it is essential today in the very processes of life, both plant and animal. Its absence in the soil—the food of plants—results in barrenness to essential crops; its absence in the food of animals results quickly in fatal "calcium deficiency" diseases. It is one tangible immortal bit of living things that readily can be traced from its origin in the mother earth through the living cells of a generation of plants and animals, back to mother earth in the form of shells and bones that have served their transient purpose. Quarrying the ancient deposits of these — that is, quarrying limestones—has been humorously but accurately described as "exploiting the bones of our ancestors."

Were we gifted with the necessary knowledge of geography, geology, anthropology, agronomy, and history, we could trace for you the role of limestone in the evolution and development of races of men who have conquered the earth; of fine horses and domestic animals which have won blue ribbons at animal fairs. We can be quite certain they came originally from limestone regions, like our Vermont Green Mountain Boys of Revolutionary fame and our Kentucky blue grass race horses of today.

Lime Industry on a Firm Foundation

The purpose of this digression in a journal like Rock Products is merely to emphasize that an industry founded on so indispensible a mineral as limestone ought to be established on a really solid foundation. Such an industry is the manufacture of lime. Possibly because they have considered their industry so soundly based, lime manufacturers have not been as imaginative as they would have been compelled to be with a new product; and the industry as a whole, it must be confessed, has been rather unprogressive.

The simple operation of "burning lime" involves a well-known chemical reaction—the breaking up of calcium carbonate ($CaCO_3$) into lime (CaO) and carbon dioxide (CO_2). The lime is a basic ingredient of many useful materials, from cements used in construction to carbide used in the manufacture of other chemicals; the carbon dioxide is also an essential ingredient of a host of useful materials and chemicals. The amount of carbon dioxide produced from a ton of limestone is almost as great as the amount of lime produced; yet in the present-day industry lime, the cheap, low grade product is saved and the high grade, expensive product, carbon dioxide, is wasted!

Not until recently have lime manufacturers come to look upon lime as a basic chemical. For years they sold their product for chemical and metallurgical uses, but they have had very little idea of just what uses, or just what properties in the lime the users wanted. The reason for that is very simple; the user did all the research and development work and kept what facts he learned pretty much to himself—quite naturally, since his expert knowledge permitted him to purchase and use his lime to better advantage than his less informed competitors.

The process of the development and expanding use of lime in these industries has therefore been just the reverse of the usual procedure, wherein manufacturers do the research to know and to perfect their product and to extend its uses on the basis of knowledge thus gained. The lime industry has suffered severely

from its lack of initiative in this respect. It has been the victim of well-informed purchasers, instead of the exploiter of its own indispensible product, and, incidentally, industries which should be purchasers have learned so much more about lime manufacture than manufacturers of commercial lime that they have made their own lime rather than purchase it. Only recently have lime manufacturers become aware of the necessity for special quality for special purposes as well as for mere volume of output.

Wasted Carbon Dioxide

When it comes to the other product—the wasted carbon dioxide—commercial lime manufacturers are even less informed. Sugar manufacturers and other industrial manufacturers of lime have long made use of the carbon dioxide, but its possibilities are little appreciated by commercial lime manufacturers, and so far the lime industry as such has done no research whatsoever to learn ways and means to save this product, or to find markets and uses for it.

Investigating the "distillation of limestone" in the Gillette kiln process (ROCK PRODUCTS, January, 1940, pp. 22, 23), one of the first questions that came to mind was: "What else is this uncontaminated carbon dioxide good for besides making dry ice?" Fortunately, J. H. Hillman III, proprietor of the plant, is a young chemical engineer *with vision*. Incidentally, of course, he is a *lime manufacturer with vision*. In answer to our question he listed some of the uses of carbon dioxide in industry as follows: (1) dry ice; (2) liquid carbonic; (3) acetylsalicylic acid (better known as aspirin) which is the starting point for manufacture of numerous drugs and dyes; (4) with ammonia to make ammonium carbonate and ammonium carbamate; (5) with lime to make precipitated calcium carbonate or whiting (chalk); (6) with lime to make calcium carbamate; (7) with barium oxides or hydroxides to make barium carbonate; (8) with ferrous chloride to make ferrous carbonate; (9) with lead oxide or lead nitrate to make basic lead carbonate (white lead); (10) with lithium chloride to make lithium carbonate; (11) with potassium hydroxide, manganese dioxide and potassium chlorate to make potassium permanganate; (12) with sodium phenate to make salicylic acid; (13) with sodium chloride (salt) and ammonia to make soda ash and sodium bicarbonate; (14) with ammonia to make synthetic urea; (15) with zinc chloride to make zinc carbonate; (16) with various salts or hydroxides to make corresponding carbonates such as bismuth subcarbonate, caesium carbonate, cobaltus carbonate, lithium carbonate, nickel carbonate; (17) with calcium cyanimide to make thiourea.

But that is not all, for carbon dioxide can easily be converted into relatively pure carbon monoxide by passing it over hot coke, and then carbon monoxide becomes available for chemical manufacture as follows: (1) with chlorine to make phosgene; (2) with ammonia to make various amides and cyanides; (3) with aliphetic alcohols and ethers to make various esters; (4) with halogen derivatives to make aldehydes; (5) with olefines to make organic acids and esters; (6) with hydro aromatic hydrocarbons to make various ketones; (7) with hydrogen to make methanol, ethanol and other alcohols; (8) with water to make formic acids; (9) with sodium hydroxide or calcium hydroxide to make sodium or calcium formate; (10) with metals to make various volatile metallic carbonyls; (11) with calcium hydroxide to form hydrogen and precipitated calcium carbonate.

Visions Come Before Great Industries

We presume much of the foregoing is as far over the lime manufacturers' heads as we confess it is over ours; but we present it as evidence, in the opinion of a well-informed imaginative chemist, that others can see plenty of uses for wasted carbon dioxide even if lime manufacturers do not. New industries and new markets are built on such notions. Because he can see a valuable product of lime manufacture going to waste with no interest on the part of the present lime plant owner, our chemist friend fully believes that if lime manufacturers wait awhile longer they will see chemical manufacturers of carbon dioxide dumping lime on the market as the byproduct, or near waste product. All this may be visionary as you and I see it now. But all progress and invention is preceeded by what *practical* men term visionary schemes.

For the past several years the lime industry has been shrinking in number of producers. The little fellows are being eliminated. Yet, according to studies by Oliver Bowles and A. T. Coons, of the U. S. Bureau of Mines, the most prosperous or at least most efficiently operated plants are not the very large ones, but those in the middle class of from say 30,000 to 50,000 tons production yearly. The day of the little lime burner is passing. Because there were so many of him, he was a thorn in the side of the lime manufacturer who wanted to make lime manufacture a real industry. With his exit and the emergence of the lime industry in the hands of men who presumably want to make lime manufacture a modern industry, one of the reasons which held back research by the industry ceases to exist. So, it seems to us that if the lime industry is ever going to become an honest-to-goodness, up-to-date, independent industry, now is the time for it to lead the procession in broad-gage research and development. Heaven knows it has products that justify research!

Nathan C. Rockwood

The National Lime Association will hold its annual convention May 21, 22, 23 at the Drake Hotel in Chicago, Ill.

Greatest Asset In Young Men

Who look for opportunity is a willingness to work in any capacity

Says Ben W. Calvin in this Guest Editorial

Ben W. Calvin, president, Aetna Portland Cement Co., Bay City, Mich.

You ask about certain qualifications for young men coming into the industry and want to know if they should be college graduates. It seems that most everyone can go to college now if he wants to, since there are so many colleges available. I would not say it was necessary for a young fellow to go to college, although I went myself, but if he did not go I would want to know why. If it was just because he did not have ambition, that attitude might disqualify him and not the fact in itself that he didn't attend college.

I do not see that it would make much difference as to what he specialized in. Any one of the four specialized studies that you mentioned (engineering, chemistry, business management or psychology), with the exception of psychology, should certainly be useful. The value of his specialized study would depend on where he started in the plant. Neither do I see that it would make much difference whether the fellow started in the operating or sales department. I started in the sales department. I have often regretted that I do not know more about plant operation than I do, and so I might say it would be better to start in the operating department, simply because I missed that side of it. I suppose an operator wishes he had started in the sales end of the business.

You ask if conditions are better or worse for youngsters now than they were, say twenty or twenty-five years ago. I do not see that they are much different, except that they might be better. I do not put any stock in the proposition that a young fellow hasn't got a chance today. You might be surprised when I say that I have been sitting here running this company for three years, and that just two months ago for the first time a young fellow came in and really talked as if he wanted a job. This boy walked in, asked for me, stuck out his hand, told me who he was and said he wanted a job in the cement business. He didn't care what he did, what hours he worked, or how much we paid him. He just wanted a job and would let his work speak for itself. He got a job in a hurry, although we almost had to go out and find one for him.

I started him out in the yard gang doing the hardest, dirtiest kind of work you ever saw, and he just ate the work up and acted as if he was having the best time of his life. It came time to lay him off, but I found that I could put him to work in the laboratory without any union restrictions as to his taking the job. Now he is making briquettes over in the laboratory, and he likes that.

This fellow happens to come from a very good family. Instead of looking for a soft job, he came down here to get anything he could find. I think he is going to make a very valuable person for us some day. So I do not put much stock in the first questions you ask, about whether they should be engineers, psychologists or go to some school of business administration. If they really want to work and have some character and some determination and ordinary sense, I believe they would get along just as well without it.

All our guest editors put such stress on the right *attitude* of young men toward jobs, which seems to mean a cheerful willingness to work, that it appears to be a rare quality. No doubt many young men are impatient to arrive. All generations have been.

Perhaps a typical attitude is illustrated by the following quotation from the letter of a very much educated young man, in commenting on the first of these guest editorials (February issue): "For the past four months I have been actively looking for a position which would lead to a management position. I have unearthed many positions but with a single exception I have not found one job which had any promise of leading to a position in management. I still believe there are such positions and will continue my quest."

What old timers are trying to tell young men like him is that managerial talents will come to the surface in any kind of a job.—The Editor.

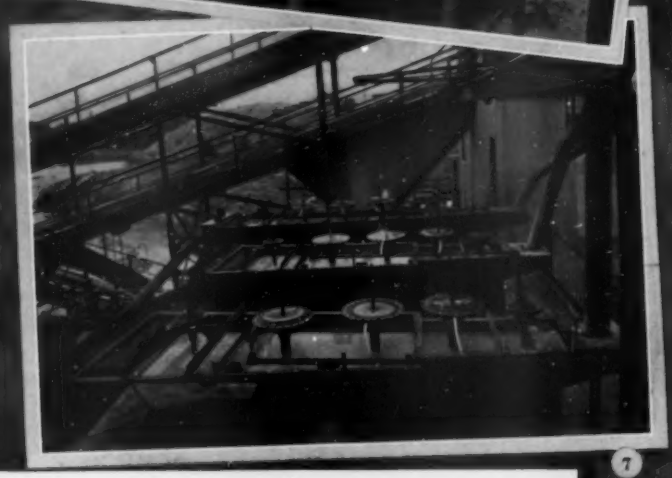


Fig. (1) Dragline with 8-cu. yd. bucket and 160-ft. boom stripping up to 35 ft. of overburden to uncover the phosphate. (2) Hydraulicking guns operated at 200 p.s.i. water pressure to wash the phosphate through cuts into the pump sump for transport by relays of pumps to the washing plant. (3) One of six twin log washers which break down and wash out impurities. (4) A typical pump of the type used throughout the plant for handling fines and slimes from various production units. (5) The washing plant, which receives its feed on the right above from the pit and delivers coarse products into bins on the left. (6) One of two hydroseparators which receive minus 3/64-in. material from the washing plant. (7) Close-up of the sizers which make necessary separations of the fines ahead of the flotation plant. (8) Screen boxes where valuable fines are recovered under water

Screening Under Water For Phosphate Recovery

Process of screening intermediate fines and the use of flotation for the extremes contribute materially to output of rebuilt Florida plant

By BROR NORDBERG

OUTSTANDING among the Florida pebble-phosphate recovery plants is the washing and flotation plant operated by the Swift and Company Fertilizer Works two miles south of Fort Meade, Fla. It was built, of all-steel construction, in 1938 to replace one nearer the company's drying plant at Agricola, Fla., when that area had been depleted.

Flotation Process Combined With Under-Water Screening

In the treatment of fines, an entirely new method was incorporated into the plant flow sheet to recover intermediate fines which are too coarse for flotation and too fine to be handled successfully over the washer. This particular size range, running somewhere between 20- and 48-mesh, would not float out and the recovery was bad, because these phosphate fines contain a large percentage of coarse sand.

Phosphate is separated from the sands in this process by under-water screening. All the fines from the washing plant end up in two 40-ft. diameter hydroseparators from which they are pumped into feed tanks serving the fines recovery plant. The control unit consists of three Dorr-Fahrenwald 5-pocket sizers, that are in effect hindered-settling-type classifiers, which generally divide the fines into three sizes. A plus 20-mesh product is withdrawn from the first two spigots and usually also from the third; it is then pumped by a 4-in Wilfley pump to vibrating sizing screens where it is dewatered and discharged into a 300- ton steel bin as one of the finished products.

Minus 20-mesh material is divided into two fractions at about 48-mesh. The fine fraction, including the overflow from the sizers, is straight flotation feed, and the coarse fraction, 20-mesh to 48-mesh, generally from the fourth spigot and occasionally from the third and fifth, is put through a 6-ft. Dorr rake classifier and, after being dewatered, is the feed for the "agglomeration-flotation" process.

This feed material is treated with reagents which cause only the phosphate particles to agglomerate. In the separation process, in water-filled tanks, an inclined screen (sloped 53 deg. to 55 deg.) is used. The screen is of .009 in wire and has .00465-in. openings (18-mesh). The sands pass through the screen cloth, while the agglomerated particles pass over the screen. The tailings are then put through flotation cells for further recovery of phosphate values. This process was developed and patented by Messrs. McCoy, Hall and Wright, company officials.

The company had adopted the flotation process controlled by the Phosphate Recovery Corp., and has operated a flotation plant since 1935. Recovery has increased from 25 to 60 percent by the addition of flotation and under-water screening.

Swift and Co. Fertilizer Works has been producing phosphate at Agri-

Fines recovery plant showing sizers in foreground, and surge bin for feed to flotation plant on extreme right

Loading out sized pebble phosphate into flat cars from suspended-type steel bins

cola for over 30 years and operates a drying plant and fertilizer plant at this point. Phosphate rock produced at the washing and recovery plant and dried at Agricola is shipped by rail to other plants of the company to be converted to superphosphate for the manufacture of commercial fertilizers. Some of the output is sold to other fertilizer manufacturers. About 400 cu. yd. of phosphate per hour is handled through the washing plant. The flotation plant operates on a 24-hr. basis to keep pace with the output of fines from the washing plant.

Stripping and excavation are patterned along the same lines at all the pebble phosphate mines in Florida, using long boom draglines to open wide cuts in the topsoil and hydraulic excavation under high pressures. Swift is excavating at two locations. At the principal mine, stripping is done with a Page "630" electric walking dragline (new in 1938) that has a 160-ft. light, alloy steel boom and an 8-cu. yd. Page bucket which opens a cut from 180 to 200 ft. wide. Overburden ranges from 4 to 35 ft. in thickness and covers a matrix 8 to 30 ft. thick. Some of the pay material is loosened and piled up in the pit, cutting down the work of excavation and speeding up operations.

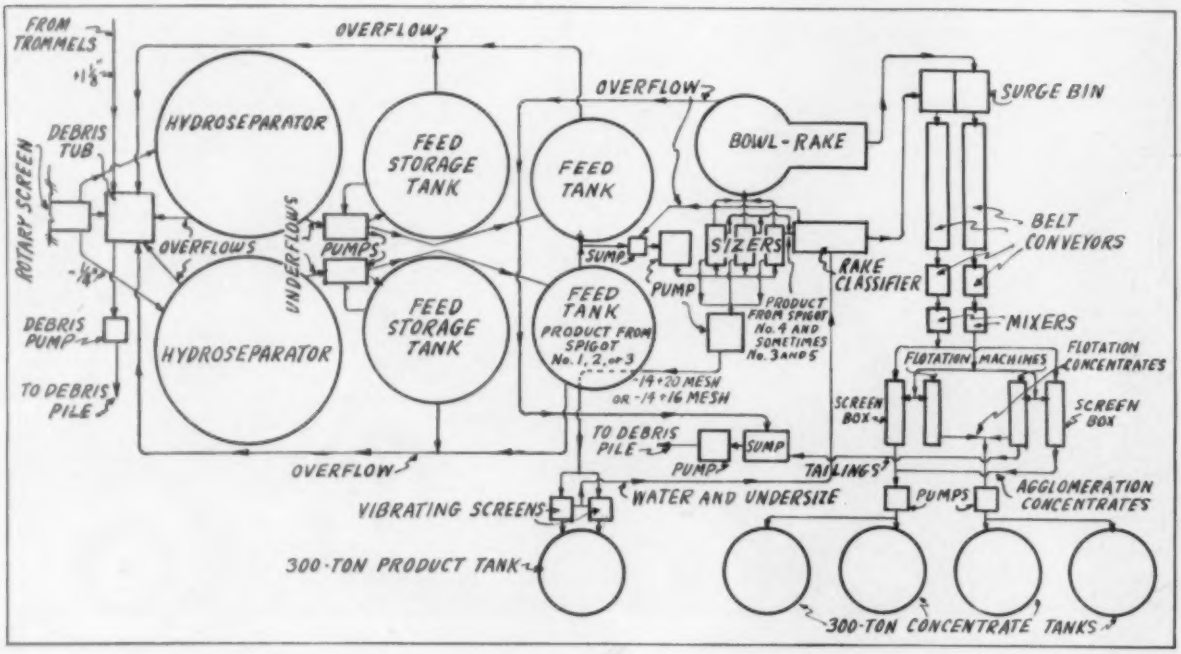
Hydraulicking is done under 200 p.s.i. water pressure, using two 1¾-in. Georgia nozzles fed by a 14-in. line from two Worthington pumps driven on a single shaft by a 500-hp. electric motor. The mixture of pebble phosphate and water, about 30 percent solids, sluices through radial ditches into a sump, at each location, and is pumped to the washing plant over distances of up to a mile or more. Pumping is done in relays, using 10-in. Georgia Iron Works centrifugal pumps, spaced 800 ft. to 1000 ft. apart and delivering through a 14-in. pipeline into a feed tank at the washing plant. This feed tank levels out surges and provides an even distribution of material flow through the washing plant.

Screening and Washing Operations

From the feed tank, the material is split equally to two series of four screens each where water is applied through high pressure sprays. First in each series of screens is a 4- x 12-ft. Georgia trommel with 1⅛-in. round openings. Oversize from these screens, containing considerable clay, enters a debris sump. Minus 1⅛-in. material is put over two consecutive 6- x 12-ft. stationary dewatering screens over a 5- x 10 ft. single-deck Link-Belt gyrating screen with 3/64-in. sq. openings.

Undersize from these screens is then put through a 4- x 12-ft. revolving screen to scalp out any objectionable material before entering two 40-ft. hydroseparators which are the first

Flow diagram for phosphate fines recovery plant, feed to it coming from the rotary screen on extreme left



On left are pebble phosphate bins and washing plant, on right concentrate bins

units in the plant for fines recovery.

Oversize (plus ¾-in.) from the last screens in the series goes into a 400-ton steel surge tank, and is then given an intensive scrubbing and washing through three duplicate sets of equipment. The first unit in each row is an 8- x 20-ft. Georgia twin-shaft, log washer which discharges into an enclosed bucket elevator feeding the scrubbed product to a 4- x 5-ft. Link-Belt dewatering vibrating screen with 3/64-in. openings.

Overflow from the three log washers is pumped back into the feed tank which receives fresh material from the mines. Material passing through the two dewatering screens enters the previously-mentioned hydroseparators.

Analyses of the final products determine whether the run-overs from the dewatering screens should be put through a second set of three 8-x20-ft. log washers or whether the rock is clean enough to by-pass them to enclosed bucket elevators which discharge over sizing screens. Here again, if the washers are used the overflows join the pit run material in the feed tank.

Elevators discharge the scrubbed material to 3- x 5-ft. Link-Belt gyrating screens with 5/16-in. openings. There is provided in the plant layout a crushing circuit, sometimes used, consisting of a Georgia double-roll crusher, a Niagara scrubber and a 4- x 5-ft. Link-Belt screen, for crushing down oversize and returning it to the 3- x 5-ft. screens.

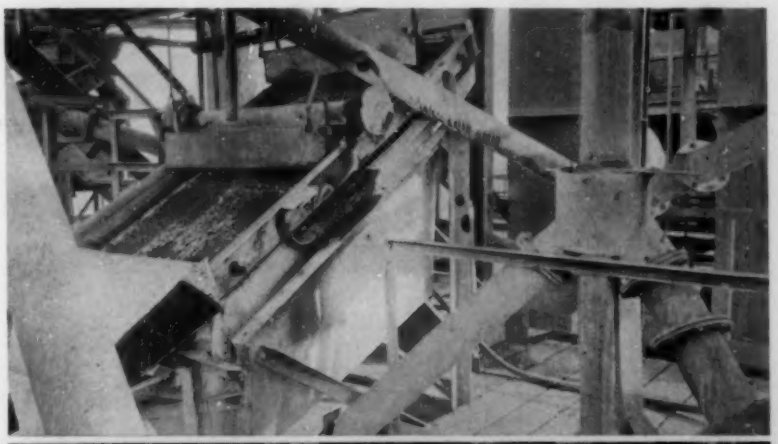
Throughs are put over 4- x 8-ft. Link-Belt vibrating screens and a 3/64 by 5/16-in. product is discharged into a 400-ton steel storage bin. Minus 3/64-in. slimes are routed to the hydroseparators and the plus 5/16-in. material is put through the Niagara scrubber, and then elevated and sized over 4- x 5-ft., double-deck vibrating screens.

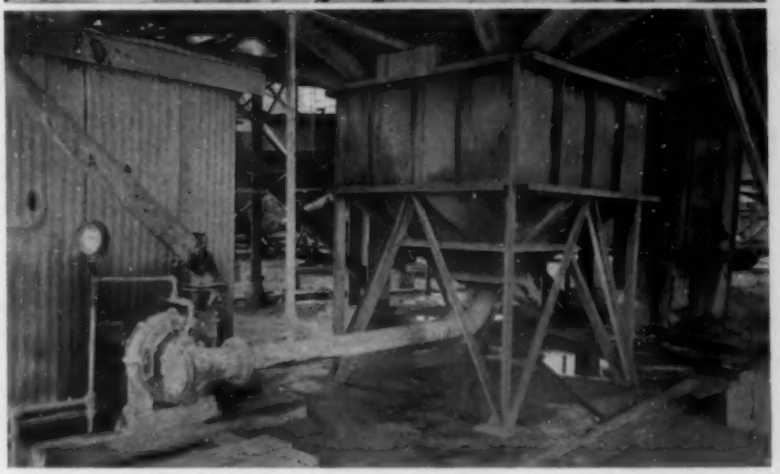
Recovery of Fines

A plus ½-in. product, usually low-grade and containing some bed rock or sand rock, is put into railroad cars direct, and a 5/16- to ½-in. product is placed into a 400-ton bin by a horizontal belt conveyor equipped with a travelling tripper.

Feed to the separate plant for recovery of fines by screening, agglomeration and flotation, consists of minus 3/64-in. material from the various screens in the washing plant, all of which was first put through a 4- x 12-ft. revolving screen preceding the two 40-ft. Dorr hydroseparators. This screen has ¼-in. openings and rejects any oversize to the debris

(Continued on page 40)





Top: One of vibrating screens used to size washed, pebble phosphate. Bottom: Rubber-lined pump to return log washer overflow to original feed

Profit in Stone Screenings Blended with Sand

STONE SAND is a product of great interest to any producer of crushed stone who has a surplus of screenings. There are some very good manufactured sands on the market and there are some excellent concrete jobs in which stone sand has been used.

Without exception, the stone sand used on these jobs was manufactured in a well-designed plant with sufficient production of screenings and an available market large enough to warrant a sizeable investment.

On the other hand, there are stone sands on the market that are really nothing but screenings, with little processing. These inferior sands will give rise to objections by users that they produce a harsh concrete and that the concrete will require too much water causing it to spall. Some of these stone sands contain excessive amounts of elongated particles and most of them are lacking in fines, yet expensive equipment to recover the fines or to grind coarser particles into fines is not warranted.

Blend Stone Sand with Natural Sand

The Weston and Brooker Co., Columbia, S. C., has met this latter problem and has increased its outlets and improved its market by blending a natural bank sand with coarse screenings sand to produce a stone sand that meets state highway specifications satisfactorily.

Feeder for proportioning stone screenings and sand out of the blending bin

The company operates a crushed granite plant of 150 tons capacity per hour. The rock is a gray, fine-to-coarse-grained biotite granite running about 72 percent SiO_2 and having no contamination. Screenings are a product of crushing through gyratory and cone crushers and the finest product made, a coarse sand, is put through a reciprocating rake classifier to float off the minus 100-mesh which is limited to not more than three percent by the state.

This product has an approximate sieve analysis of 100 percent through 4 mesh, 97 percent through 8 mesh, 65 percent through 16 mesh, 10 percent through 50 mesh, and 2 percent through 100 mesh.

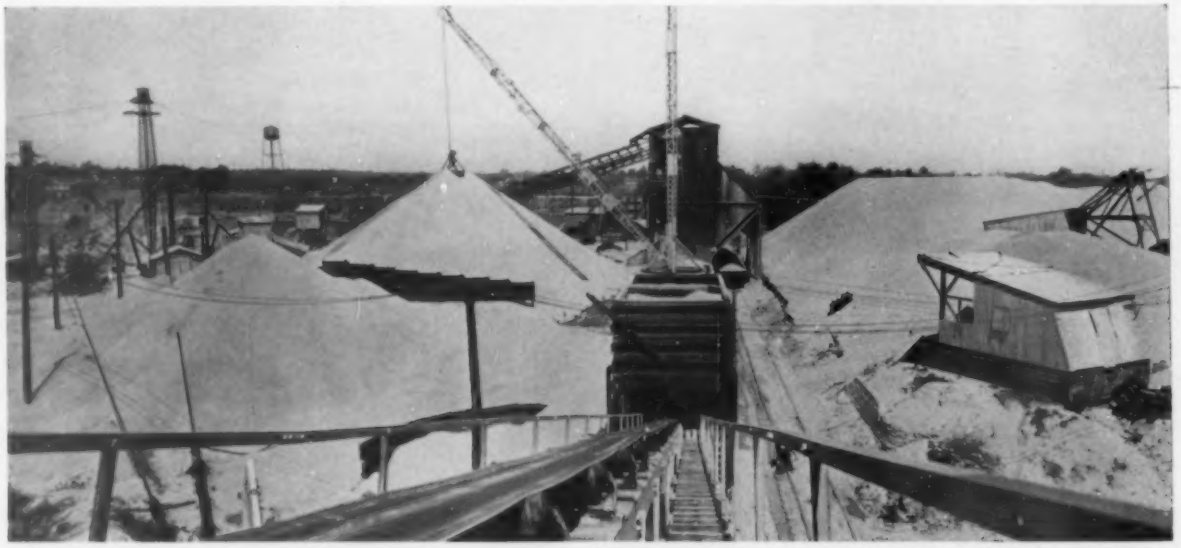
It will be seen that the gradation is weak around 50-mesh. Much of this material is sacrificed in overflowing an excess of minus 100-mesh from a small rake classifier, but the amount of feed into the machine (screenings) is small, only 7 to 10 percent of production, and therefore did not justify an elaborate plant to catch all the needed fines. Neither did the market, since some of the sand produced is sold without added fines. For example, part of the production is sold to contractors for certain kinds of bituminous retreatment work, either as produced, or mixed with about 65 percent of ⅜-in. to 16-mesh stone. This sand, being of granite, is sharp.

As retreatment work did not take all the granite sand production, a blending plant was built about 1½ years ago to mix granite sand with a bank sand to produce concrete sand. The bank sand, within a short hauling distance, is a fine, rounded sand with the following gradation:

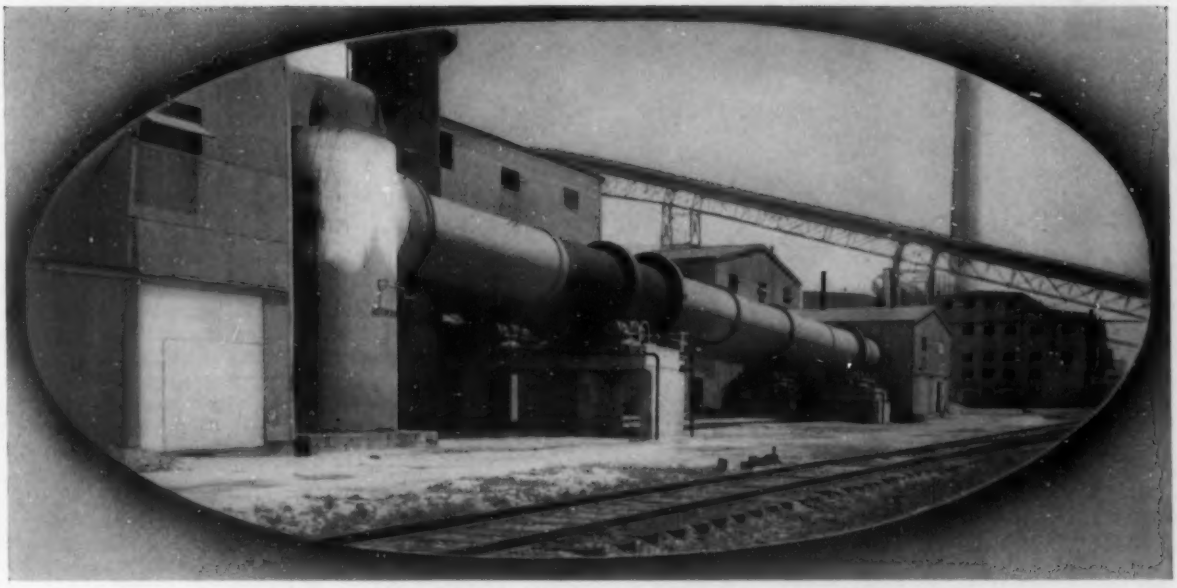
Percent passing	Sieve
100	No. 4
100	No. 8
28	No. 50
5	No. 100

This sand is purchased from commercial producers and trucked to the plant where it is stored in open stockpiles adjacent to the granite sand and near the blending plant. The blending plant is adjacent to the railroad

(Continued on page 52)



Stone sand blending bin in center showing stone plant in background and derrick system for handling screenings into the bin



Rotary lime kilns of West Virginia Pulp and Paper Co., with pulp plant in background

Making Lime in Rotary Kilns From Carbonate Sludge

Electrically welded kilns produce lime for causticizing soda as a continuous process in making pulp

SODA, in the form of a cooking liquor, is used in the paper industry to digest the wood chips, dissolving out of the wood all except the fibrous material.

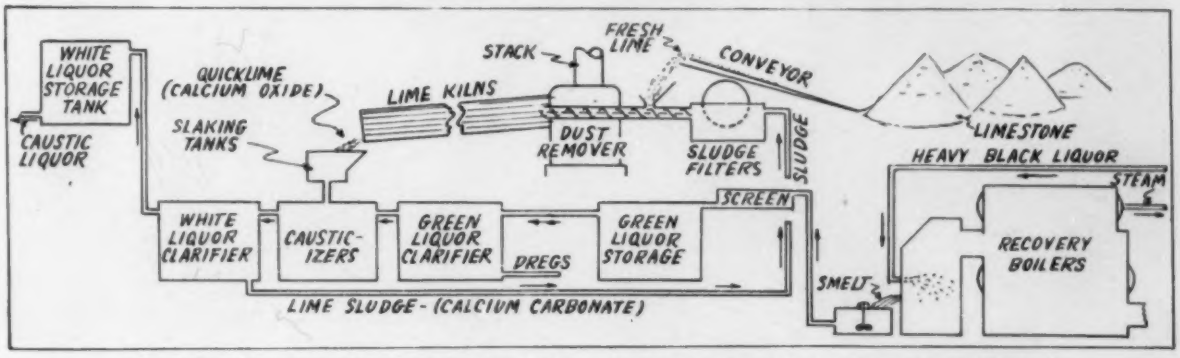
To re-use the soda as a cooking liquor after it has gone through this cycle, it is recovered and causticized with quicklime to make it available. This cycle is repeated over and over again. Quicklime is spent during the process, since in converting the soda to the hydroxide form the CaO reverts back to the carbonate.

At Charleston, S. C., West Virginia Pulp & Paper Co. built a new kraft board plant in 1937, including a modern rotary kiln lime plant which is part of the continuous paper-making process used to calcine the spent lime and produce make-up quicklime to replace that lost in the pulp process.

At this plant the spent liquor from the digesting process, containing soda, sulphur and lignin, is first evaporated. The lignin is then burned and the soda salts are reduced so that they can be dissolved out as sodium carbonate and sulphide, known as green liquor. The next step in the process is to clarify the liquor in a 38-ft. Dorr settling tank from which the dregs are removed and washed for further soda recovery.

Lime causticizer is then added to the clarified liquor, the reaction being the exchange of soda for calcium precipitated as calcium carbonate sludge, which is then removed in another 38-ft. Dorr thickener.

After this reaction, the caustic soda solution is decanted and stored ready



Flow diagram of lime plant, showing how vital continuous operation is to the making of the pulp

One of thickeners for settling calcium carbonate sludge

for re-use in digesting wood chips. The calcium carbonate sludge is drawn off over a classifier and passed to two Improved Paper Machinery Corp. vacuum filters in series, washing out any remaining soda salts. After the first filter treatment, another slurry is formed and put through a thickener to be followed by the second filter. The resulting cake is the feed for the lime plant.

Sludge, in cake form, contains about 40 percent moisture as fed into the kilns by screw conveyors. It also contains about five percent impurities, consisting of iron oxide, aluminum oxide and about ½ percent sodium carbonate and one percent sodium sulphate. The classifier is an 8-ft. Dorr bowl with dewatering rakes.

The lime plant has two 8½- x 170-ft. Traylor all-electrically-welded kilns, two-tire mounted and fired by fuel oil. The kraft board plant has a normal daily capacity of 300 tons of linerboard for box manufacture, requiring 90 to 100 tons of CaO daily when operating at peak capacity. Requirements fluctuate according to impurities in the product and theoretically average about 425 lb. of lime to a ton of kraft pulp.

Generally, one kiln produces the plant requirements, the other being a standby for supplementary duty.

While calcium carbonate cake is calcined for re-use, about 25 lb. of makeup lime per ton of pulp is needed to replace that lost in the pulp process. To make up this loss, fresh raw materials testing 95 percent $CaCO_3$ are fed into the kilns, the feed being by way of the same conveyors feeding sludge cake into the kilns.

Kilns have the standard slope and turning speeds common to the commercial lime industry and are fired with No. 13 Best oil burners with a fairly long flame. They are lined with 75 percent alumina kiln block in the hot zone and with high grade fire clay brick in th cooling zone, the total lining extending 145 ft. from the firing end. The end 25 ft. is unlined. Each kiln has chains in its back end to facilitate the heat exchange with the wet slurry-type feed. Temperatures of about 2200 deg. F. are maintained in the hot zone.

Both kilns exhaust into a common, large expansion or precipitating chamber at the base of a stack. An induced draft Clarage fan of 50,000 c.f.m. capacity at 340 r.p.m. is used, but only occasionally, when the lime is running cold or it becomes necessary to burn out kiln ring formation near the firing end.

One of the biggest single factors contributing to fuel economy has been the installation of a water spray system within the precipitating chamber. The chamber is partitioned, with a vertical separator which is effective as a baffle to slow the velocity of the gases before they enter the stack. About 40 ft. up from the ground inside the chambers, Sprayco sprays are constantly in operation, utilizing about 350 g.p.m. of fresh water which is pumped into the system and re-circulated.

As a dust collector, the system is effective in recovering about 90 percent of the fine lime that reaches the 100-ft. stack. This dust and water are pumped from the dust chamber into a settling tank, the settled lime being recovered and used with the other causticizing lime.

Lime from the kilns discharges into slaking tanks which are circuited with the cauticizing plant, the slaking operation requiring 3½ hours for a 45,000 gal. batch. A 4-in. Morris slurry pump is used for conveying.

Fuel consumption has been reduced from over 90 gal. of bunker C fuel oil per ton of lime at the start to 75 gal. This is a 19,000 B.t.u. per lb. fuel. Similarly, by general economies and dust recovery, the make-up lime required has been reduced from 110 lb. per ton of pulp to 25 lb.

T. A. Cook is general manager of operations and J. D. Cowan, pulp mill superintendent.

Left: Showing part of dust precipitating chamber. Right: Sludge circulating pump with discharge end of kilns overhead

Settling tanks and blending boxes are used for classification and recombination of sand fractions

By LATHAM GRAY*

Cones which reject desired minus 100-mesh particles

Grading Fine Sand Products

A LARGE RIVER delta deposit of sand located on the Utica-Montreal branch of the New York Central railroad about a mile south of the station of Buffalo Head and 28 miles north of the city of Utica, N. Y., was located, tested and approved by The General Crushed Stone Co., and a plant was built in 1938.

The deposit covers several hundred acres, has a nearly level surface and is underlaid with a thick water-impervious deposit of blue clay, presenting an irregular surface from two to 20 feet below the natural water table. The workable deposit is 20 to 35 ft. thick.

Because of the screen analysis and the widely differing available markets, it was necessary to design and build a very flexible plant permitting rapid, easy changes to meet the wide specifications of the market served. Since a very large percentage of the products are shipped by rail, the plant was designed to meet this condition. About 1300 ft. of siding with 0.5 percent grade was constructed from the main line, permitting the handling of both loaded and empty cars by gravity to and from storage.

Near the center of the railroad siding, in a portion of the deposit that had been worked to the water line over 20 years ago, a structure was built, designed to carry only the necessary machinery, with a small bin to hold the gravel, which is only about 3 percent of the deposit. The finished sand product is flumed to one of four stock piles, which will hold 30,000 tons, or is loaded direct to the cars for shipment. Because of the natural water supply and the necessity of using large amounts of water in grading, it was decided to use an 8-in. plain suction dredge for excavation in spite of the presence of about 3 percent of gravel up to 8-in. size. Much of the minus 48-mesh sand is under water.

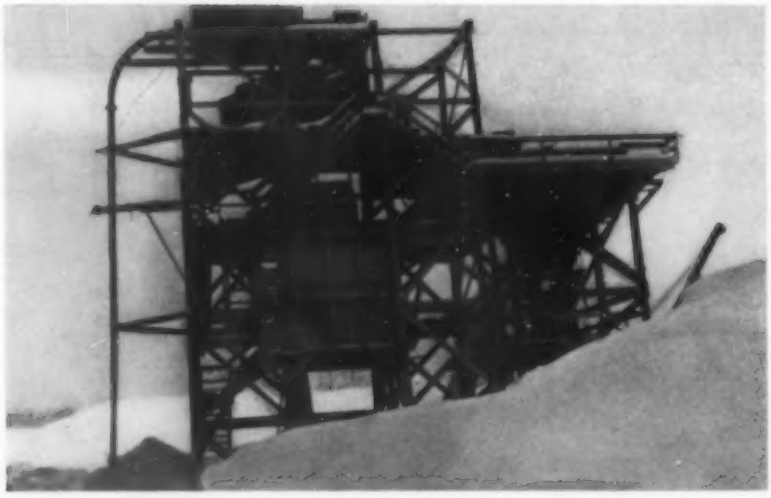
The hull of this dredge was built of oak and yellow pine on the bank of a small pond left by past operations and is 4- x 18- x 36-ft. in dimensions.

The dredge, shown in working position here, is equipped with jets to sluice the bank and to mix the bank sand at the suction hood

Use Stone Trap to Eliminate Oversize

All mechanical equipment was furnished by the Morris Machine Co. of Baldwinsville, N. Y. An 8-in. sand pump, alloy lined and direct driven by a 150-hp. G.E. 580 r.p.m., slip-ring motor was installed. The suction end was equipped with 8-in. steel pipe to a 3- x 3- x 6-ft. underwater dump stone trap designed by D. C. Hicky, chief engineer of the General Crushed Stone Co., and Mr. Pfarrer of the Morris Machine Co. This trap can be dumped while the dredge is in operation by reducing the vacuum to

* Formerly superintendent of this plant, now part owner of a crushed stone plant near Tarpon Springs, Fla.



General view of plant. The flow of material is from left to right

about 5-in. The suction beyond the trap is equipped with 6 ft. of Goodyear dredge suction hose and 25 ft. of 8-in. steel pipe ending with a standard suction hood covered with a 6-in. square mesh screen so that the large stones may be left on the bottom of the worked over area. The suction line is suspended to a 30-ft. boom which is controlled by a 3-drum English Bros. hoist driven by a 3-hp. variable speed G.E. motor. This arrangement permits the operator to control the depth of pumping and to swing the suction through an arc of 150 deg.

The dredge is equipped with a 3-in. fresh water service pump direct-driven by a 15-hp., 1800 r.p.m. G.E. motor at 60 lb. pressure. This pump delivers fresh water to the dredge packing gland and to the monitor nozzle located on the front of the deck house and furnishes water used to sluice the bank to the suction pipe. Water is also used in twin ¾-in. jets located on the suction hood to help mix up the bank sand in the solution being pumped.

Pipe is carried over the water by pontoons built of oil drums and connected by 8⅝- x 24-in. Goodyear dredge sleeves. The pipeline is equipped with extra heavy 8-ft. radius 90 deg. bends where necessary. The pontoons also carry three strands of rubber-covered stranded wire which delivers power from the transformers at 220 volts to the distributing fuse board located on board the dredge.

Flexible Control Over Particle Sizes

Sand and water are discharged into the shallow end of a primary settling steel box 30-in. wide by 14-ft. long that is 18-in. deep on the intake end and 60-in. deep on the discharge end. A square 8-in. slide gate is fitted above the screen in the bottom of the settling box to control the screen feed. An adjustable dam permitting the control of the water level and therefore the size of particles bypassing the screen is installed beyond the screen feed opening. Overflow of the dam, carrying the fine sand and surplus water, is piped to either the Telsmith settling tanks, the Allen cones or direct to the discharge flume. By adjusting the height of the dam or changing the size of the screen feed gate, or a combination of both, the minus 48-mesh material in the concrete or course plaster sand can be controlled from a minimum of 5 percent to a maximum of nearly all that is being pumped. This arrangement allows minus 48-mesh sand to be added to any product being graded by the settling tanks.

Blending Box for Correction

Water, sand and gravel passing the feed gate fall directly onto a 3- x 12-ft. double-deck Tyler-Niagara screen fitted with ¼-in. sq. mesh cloth on the top deck and .045 Ton-Cap Cloth on the bottom deck. Rejects from the top deck go direct to a small bin and from there either to the customer or to stockpiles by truck. All minus ¼-in. sand passes through the top deck to the bottom deck. The bottom deck rejects minus 14-mesh sand which falls into a blending box. Water and minus 14-mesh sand passes the bottom deck into a 3- x 5- x 5-ft. settling box which is fitted with a 6-in. slide gate in the bottom. The operator can draw through this gate any desired amount of minus 14-mesh sand into the blending box and this sand then mixes with the plus 14-mesh material. The mixture then is flumed to stock piles or direct to cars for shipment. Minus 48-mesh sand can be added in the blending box in any desired percentage by valve control of the flow pumped by slurry pump

Close-up of dredge pump and drive

described later. This arrangement results in close control of minus ¼-in., plus and minus 14-mesh, and minus 48-mesh fractions.

All dirty water and surplus minus 14-mesh sand overflows the settling box into a flume and is carried to either or both of two Telsmith tanks. A swing baffle controls the amounts delivered to either of these tanks. Additional water and minus 48-mesh sand can also be added to either or both tanks from the overflow of the primary settling box. Tanks are fitted

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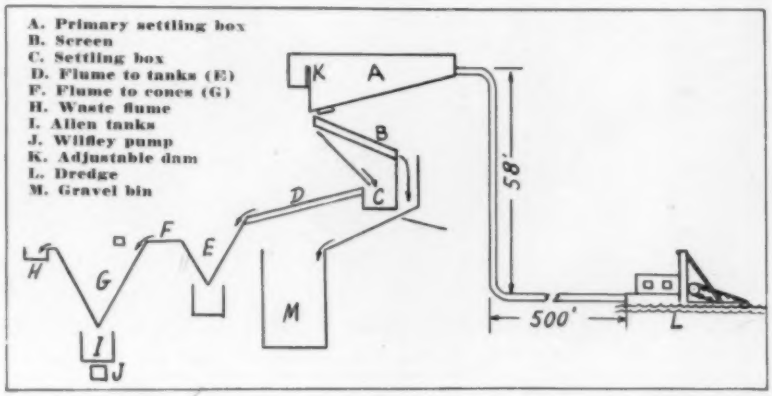


How to Improve Grinding

Concluding article covers efficiencies of grinding media, the relationship of mill speeds to efficiency, closed-circuit grinding and the use of grinding aids

*By C. D. RUGEN, J. A. KIVERT, and R. E. BOEHLER

NUMEROUS TYPES of grinding media have been used in ball and tube mills. These include stone pebbles in the older type mills, steel balls of various sizes and steel shapes of various contours. The type and gradation of ball sizes in any given mill is a subject requiring specific investigation of the mill in question.

Numerous investigations of old vs. new balls, and balls vs. punchings or other special shapes have been made. Nothing conclusive for general application can be gathered from a study of available test data along this line. The size of mill, type of liner, speed, and character of feed all influence the selection of grinding media for a given application.

It appears that too much emphasis has been placed on the necessity for grinding media large enough to reduce the largest size particle in the feed. The velocity of impact, the number of blows, the shape of the particles and the relative position of balls to particles at the moment of impact or nip are all factors affecting the top ball size. A charge of small balls contains considerably more potential impacts than the same weight charge of larger size balls. For example, 100 lb. of ¾-in. balls contain 1600 pieces and 100 lb. of 1-in. balls contain only 676 pieces. Particularly in closed circuit work, where it is not necessary to reduce all of the large particles in the first pass, the smaller balls with their greater number of impacts are capable of producing higher surface. The larger balls of a mixed charge usually tend to "coat" first.

In most cases, the time and expense involved in investigating various sizes and shapes of media will pay dividends. Where such tests are made, if several identical mills are available, a comparison between separate mills each loaded with different types of grinding media, is preferable to tests made on a single mill loaded successively with the various charges. This procedure will tend to compensate for variables in grindability, temperature, and other extraneous conditions.

Some tests indicate that a mill loaded with smaller size balls will require more power than the same mill loaded with an identical weight of larger balls. This may be expected if and when smaller balls do more grinding and is probably due to changes in ball paths, angle of nip, and ball-load friction.

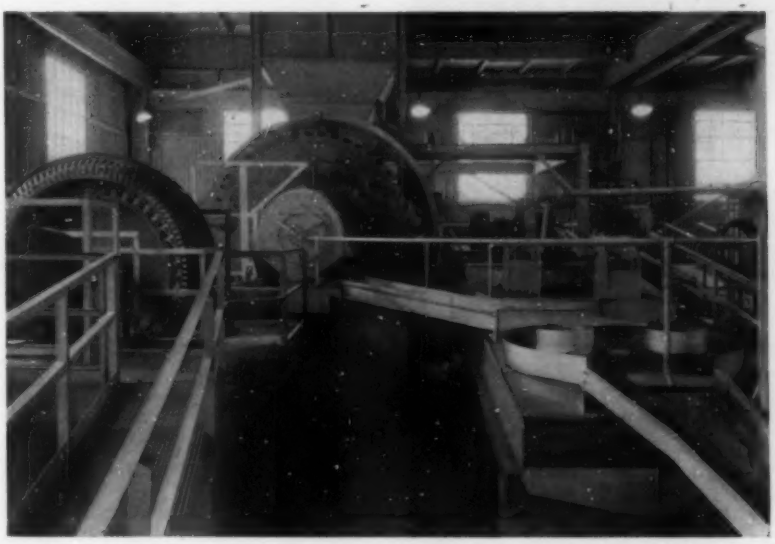
Independent of mill speed and type of liners, most ball and tube mills will give increased output as volume loading is increased up to an optimum. For mills with roughened liners or lifting elements, loads of 41 percent to 43 percent of volume have been found to result in maximum output. Assuming that mill and motor can carry still higher loads, further additions in loading should be analyzed carefully. Tests with volume loadings up to 46 percent indicated no increase in output resulting from the last 4 or 5 percent increment of load. At some point below 50 percent of volume, depending on the type and quantity of feed and condition of liners in the mill, both power and performance will fall off rapidly with further increases in the charge volume.

Ball wear is another factor that should be considered in this connection. Relatively low ball wear is not necessarily a favorable indication—in fact, it may be the reverse. As work done in grinding is increased it is to be expected that ball wear also will increase.

Effect of Mill Speed

Practically all direct-connected ball and tube mills are driven with constant speed induction or synchronous motors. Hence there is little opportunity to investigate the effect of speed changes on most commercial mills. Mill speed, along with the type of liners and shape of media, determines the trajectory of the balls, the point of impingement, and influences the flow of feed through the mill. Laboratory investigations of mill speed have thrown some light on this subject, but frequently such tests do not predict field conditions particularly with respect to type of liner which is all important in determining the "correct" speed. Glass end laboratory size mills are sometimes used to ad-

* Engineering Department, Universal Atlas Cement Co., New York, N. Y.



Preliminary mill and classifier grinding system at Leeds, Ala.

Automatic type of feeder equipment used in Hudson, N. Y., plant to proportion raw materials into grinding mills

vantage in studying the effects of speed, liners, and charge volumes on ball action.

Most commercial tube mills operate in a range of from 60 percent to 75 percent of theoretical "critical speed." Impingement of balls at the "four o'clock" or "eight o'clock" position, depending on the direction of rotation of the mill, is usually considered to produce best results. Some clue as to the impingement position can be obtained from the sound of the operating mill. A "noisy" mill may indicate that the balls are being carried over too far. A "dead" mill may indicate too low an impingement or a building up of feed in the mill. Changes in design of the surface of the liner plates or in mill speed can frequently be made to improve the ball action. Power input will increase in about the same ratio as speed is increased within the speed range of useful grinding action. Mills turning below 70 percent critical speed are logical subjects for investigation, since higher speeds may be advisable to increase total output. A change in the speed of a fine grinding tube mill from 67½ percent critical to 71½ percent critical resulted in a greater percentage of output improvement than of increase in power consumed, indicating improved grinding efficiency. In another case, changing a preliminary ball mill speed from 62 percent critical to 74 percent critical resulted in about 40 percent increase in output with only 20 percent increase in power input.

Mill Discharge Screens

In open circuit work and particularly where lower volume loadings must be used, the ratio of balls to material is important. This ratio is more or less governed by the type and design of the discharge screen and by the distance on the screen partition from the liner plates to the screen openings. Material flows through a tube mill when there is a higher speed at the feed end than at the discharge end, and in cases where the screen openings are low the material will flow too readily towards the discharge end. This results in a high ratio of balls to material and limits the amount of grinding action in at least a portion of the mill. It is desirable occasionally to shut a mill down under full feed load and to sample the material from each foot of length. Careful comparison of fineness and specific surface of successive samples is valuable in designing both the discharge screen openings and the ball sizes.

Frequent Specific Surface Determinations Needed

Before conclusions can be made from investigation of a grinding operation, representative and accurate determinations of product fineness and specific surface must be made. The average plant laboratory is not in position to make as many specific surface determinations as an investigation might warrant. The use of the turbidimeter to measure cement specific surface has been accepted by the industry and by cement users as standard. In experimental work, it frequently is desirable to determine variations of the order of two or three percent. Such work requires careful sampling and frequent specific surface determinations to insure reasonable accuracy. A dependable record of specific surfaces cannot be obtained unless a large number of samples are collected and determinations made on each sample. It may be worthwhile to suggest that the development of an automatic recording turbidimeter or its equivalent would be of considerable help in routine mill control, as well as in the study of grinding problems.

In many plants, 200 or 325-mesh finenesses are still used as the basis for mill control, supplemented by and in studying the characteristics daily or weekly average specific surface determinations. If the grindability of mill feed is uniform and if it is not required to change fineness frequently for varying specifications, such control may be reasonably satisfactory although correlation of sieve fineness to specific surface is only an approximation at best.

An analysis of micron size-weight distribution is desirable in analyzing the performance of grinding circuits on different cements. When air separators were first introduced in clinker grinding circuits it was found that an air separated cement produced lower strengths than cement ground from the same clinker to the same 200-mesh fineness in open circuit. It was common practice to grind to what was believed to be higher finenesses in air separator circuits. The application of size-weight analyses showed that the higher percentage of material passing the 200 or 325-mesh sieves was compensated for by lower percentages in some of the sub-sieve sizes. Hence an open circuit mill converted to closed circuit must grind to a higher sieve fineness in order to obtain the same specific surface.

Although the use of the turbidimeter has been applied primarily to determination of cement specific surfaces, methods have been developed for determining the specific surface of ground raw materials. The general conception of desirable raw fineness is somewhat different from that of cement. To enable proper combinations in the kiln, it is desirable to eliminate material coarser than 325-mesh. It is doubtful if the presence of a large proportion of sub-sieve "flour" is necessary or desirable in kiln feed.

Due to their inherent physical structure most rocks used for kiln feed when reduced to a given 200 or 325-mesh fineness, invariably contain more sub-sieve sizes and hence, a greater specific surface than cement clinker ground to the same sieve fineness in the same or similar units. Fig. 4 illustrates typical size-weight distribution curves of raw mix-kiln feed and portland cement produced in modern closed circuit units. Cumulative percent finer than a given micron size is plotted on a linear scale against micron sizes on a logarithmic scale. It is possible in some cases to determine a probability scale for a given material to replace the linear ordinate, so that the curves will be straight lines. This enables prediction of size-weight distribution if two points are known. A positive method of controlling the lower as well as the top sizing in fine grinding has not as yet been developed.

Air Separators

In recent years many installations of closed circuit grinding have been made employing screens or classifiers in the preliminary circuit and air separators or fine classifiers in the finishing circuit. The additional output resulting from close circuiting

a clinker grinding installation when grinding to standard cement fineness may be proportional to the additional power required to operate the closed circuiting equipment, hence the power consumption per bbl. will not be changed. On the other hand air separators are not only of economic value but are frequently absolutely necessary for extra fine grinding where they greatly improve the efficiency of the circuit. In general, closed circuiting is of value almost in direct proportion to the specific surface of product.

It is necessary to determine the proper circulating load for each closed circuit system and for each type of material and fineness requirement on the same system. No fixed percentage of circulating load will result in maximum efficiency for all cases. The development of the air separator was based on the principle that it is desirable to remove acceptable finished product from the mills as soon as possible and return only oversize for regrinding. This enables mills to handle greater feed rates since all material need not be completely finished in one pass. There are numerous modifications possible in flow arrangements in closed circuits, particularly where multiple compartment mills are used. Determination of the most desirable arrangement can be made only after sufficient data has been accumulated on the performance of all possible circuits.

Excessive circulating loads are undesirable because they reduce air separator efficiency and subsequently, grinding action due to the cushioning effect on ball action of the fines returned to the mill. Circulating loads which are very low may result in removal of some coarse particles with the fines. The "cleaner" tailings also reduce the "lubricating" effect on flow through the mill, which may reduce output. It is beneficial to equip motors on elevators carrying separator feed or tailings with sensitive indicating ammeters. These provide the mill operator with a simple guide in making separator adjustments for maintenance of proper and uniform circulating loads. An experienced operator can also judge circulating loads quite closely by observation of material loads in moving elevators and conveyors. Maintenance of the optimum circulating load through use of one of the above methods will promote maximum performance of the circuit. Calculations of circulating loads and separator efficiencies from finenesses of grab samples may be useful during test operation, but unless large numbers of samples are taken, the results are not likely to be representative.

Finer grinding tends to increase mill temperatures and consequently promote ball coating. High temperatures in clinker grinding mills are objectionable both from the standpoint of grinding efficiency and cement quality. Closed circuit mills are generally less troublesome in this respect due to the cooling action of the air separators. If temperature of cement discharged is above 220 deg. -230 deg. F., difficulties with ball coating and false setting cement may result. Low clinker feed temperatures, air circulation through the mills and the use of water sprays, particularly on open circuit mills, will contribute to lower temperatures in grinding.

Dust Collectors

Many grinding mills are equipped with dust collectors which remove dust and ventilate mills and auxiliary equipment. Such installations assist in cooling the mills through air circulation. The volume of air handled may result in velocities sufficiently high to remove coarse dust from some points in the circuit. If specific surface of collected dust is lower than that desired in the finished product, it is advisable to return the dust for regrinding. Air flow and pressure measurements taken at various points in the system will be of aid in balancing the flow of air. Dampers can be used advantageously to maintain the desired negative pressures and air velocities throughout the system, and to reduce the amount of coarse dust entering the dust collectors.

Grinding "Aids"

The introduction of small quantities of some extraneous material with tube mill feed has been experimented with in many plants for the purpose of increasing grinding efficiency. Materials which have been considered grinding aids include water, coal, resin, oils, and patented products introduced in recent years. There are two principal factors to consider in studying the action of any of these substances. First and of most importance, is the effect, if any, on quality of product, and secondly, its economic value as a grinding aid. The quality effect may differ considerably between raw materials and cement. For instance, coal fed to raw tube mills will burn out in the kilns and be useful as fuel; whereas, coal cannot be used in clinker grinding mills because of deleterious color effects.

The value of a grinding aid probably lies in its dispersing action in reducing the tendency for ball coating. Hence more application is found in mills where ball coating is serious or in mills producing finely ground products. Grinding aids introduced in water solution, if found of value, should be compared with the same addition of water alone, in order to determine if the water has as much effect as the disperser. In any case, application of a grinding aid should be made cautiously, and its effects studied carefully before definite conclusions are reached regarding its value.

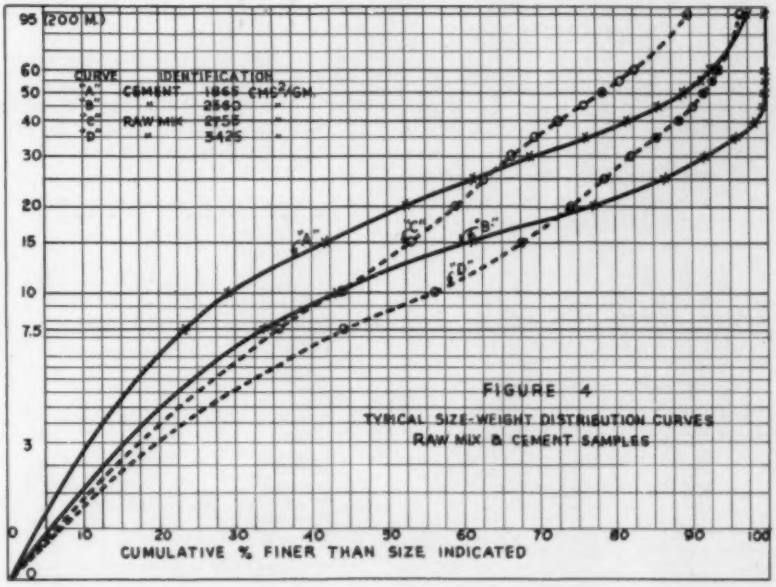


FIGURE 4
TYPICAL SIZE-WEIGHT DISTRIBUTION CURVES
RAW MIX & CEMENT SAMPLES

Preventing Fires in Plants

Rock products plants of all types can benefit from study made by the cement industry in establishing safeguards, selecting fire-fighting apparatus and educating workers

By A. J. R. CURTIS*

MOST CEMENT PLANTS constructed during the last two decades are as nearly fireproof as engineering skill can make them and many of the older mills have been thoroughly rebuilt with fire resistant materials during that period. Consequently, cement plant fire hazards have appeared trivial and the subject has received little thought.

Company and plant management have generally accepted the view that cement plants are firesafe since few can remember the last big blaze in a cement plant. Many are carrying their own insurance or have cancelled their general coverage and confine insurance protection to laboratory, bag house, pattern storage and office.

Still, surprising as it may seem to some, fires of certain classes are of almost daily occurrence in the industry. Even small fires usually expose employes to danger and may cause considerable property and business loss—sometimes losses that even insurance cannot repay. Investigation shows that fires in materials and equipment storage, electrical apparatus, oils and greases, belt, wooden structures and motor trucks may be quite serious and should be systematically studied and analyzed with a view to placing them under practical control.

So it is evidently important that cement and similar industrial plants be provided with fire extinguishing equipment of proper type and size and that employes be trained to handle such equipment efficiently. The Portland Cement Association, through its Committee on Accident Prevention and Insurance, recently made a thorough study of the situation in member mills and has just completed a report making a number of valuable recommendations. These recommendations cover the following:

(1) Types of fire fighting equipment best suited to safe and efficient use by employes.

(2) Proper distribution, inspection and maintenance of fire extinguishing equipment.

(3) Identification, registration and protection of extinguishing equipment.

(4) Employe education and organization for fire protection.

As a basis for its broad study of the subject, the Association's accident prevention committee made a careful investigation of conditions in many member cement plants and secured the active coöperation of companies operating 79 representative mills in furnishing questionnaire returns covering a wide variety of conditions. In making its analysis the committee was generously assisted by Robert S. Moulton of the National Fire Prevention Association, A. L. Brown of the Associated Factory Mutual Fire Insurance Companies, and H. W. Lange of Underwriters Laboratories.

Twenty-five fire hazards named in questionnaire returns from 79 representative mills form a comprehensive list against which every plant can profitably check its prevention needs.

Ranked in order of importance as determined by the number of cement plants reporting them, the 13 most common fire hazards disclosed by the P.C.A. committee's study are:

	SOURCE OF FIRE HAZARDS	PERCENTAGE OF PLANTS LISTING
1.	Bag storage—sorting, cleaning, repair	88.6
2.	Electric motors	86.0
3.	Grease and oil storage	84.8
4.	Oil transformers	81.0
5.	Wood office fixtures—files—waste	77.2
6.	Wood or part wood buildings	76.0
7.	Coal storage	72.2
8.	Gasoline-powered engines, motor vehicles	70.9
9.	Gasoline storage tanks—pumps	67.0
10.	Lumber storage—carpenter shops	63.3
11.	Garages	57.0
12.	Storerooms—flammable materials	53.2
13.	Wood trestles and bridges	50.6

The following sources of fire and explosion are important also, although no one was named by more than three plants:

1. Explosives magazines
2. Fuel oil—storage
3. Gas lines—regulator houses
4. Kerosene in testing equipment
5. Gas heating stoves
6. Acetylene generators
7. Welding equipment
8. Electric starters—switches
9. Forest fires
10. Prairie grass and weeds
11. Dwellings
12. Barns—storage sheds

Named as outstanding fire hazards are these five, ranked in order of their importance:

		TIMES NAMED
1.	Bag storage	31
2.	Coal storage	27
3.	Wooden buildings and structures	18
4.	Electrical equipment	16
5.	Oil storage	11

The report of the P.C.A. accident prevention committee's study indicates that, with the possible exception of coal storage, all fires likely to occur in cement plant locations may be extinguished within the first few minutes by prompt action of employes who know how to use proper extinguishing equipment. Choice of suitable extinguishers for use on fires in different classes of materials is all-important, *for the use of the wrong extinguisher may spread flame into a conflagration, it may cause serious injury or death to the operator, or it may unnecessarily damage equipment.*

Therefore, the report stresses the importance of placing the proper first aid fire fighting appliance where it may be promptly and properly used in an emergency if injuries are to be averted and extensive property loss prevented.

General Classes of Fires

Ability to distinguish three universally recognized classes of fires is necessary in order to determine the proper extinguishing equipment to use. Class A fires are those in ordinary combustible materials where the quenching and cooling effects of quantities of water, or solutions containing large quantities of water are of first importance. Wood, textiles and rubbish fall in this classification. Class B fires occur in flammable liquids, oils and greases, where a

* Secretary, Committee on Accident Prevention and Insurance, Portland Cement Association.

blanketing effect is essential. Class C fires take place in electrical equipment, where the use of a non-conducting extinguishing agent is of first importance.

Fire extinguisher chart No. 1, presented as a part of the report, briefly summarizes the characteristics and suitability of four types of extinguishers for use on fires in the three classifications and on fires in automobiles and commercial trucks.

The soda-acid type extinguisher is not included on this chart, for it presents special problems which are detailed in following paragraphs of this report. The anti-freezing extinguishers have all the desirable characteristics of the soda-acid, and are unaffected by severe weather conditions in unprotected locations.

Extinguishers for Class A Fires

Class A fires occur in bag storage and wood structures, such as office, shop and storeroom buildings and equipment, trestles, and docks.

Soda-acid extinguishers are widely used for fires in ordinary combustible material. The method of operation of the common 2½-gal. size is quite generally understood. It is simple, durable, easily recharged and maintained. Principal liquid is a water solution of sodium bicarbonate (baking soda). Soda-acid extinguishers are effective only where a quenching effect is needed. They are not suited for fires in flammable liquids, except small fires in liquids miscible with or heavier than water. Soda-acid solution is a conductor of electricity and is especially dangerous if applied to live apparatus. The extinguisher should be used only on dead electrical equipment and only if carbon tetrachloride or carbon dioxide extinguishers are not available or prove ineffective. The residue may be difficult to remove and may be slightly corrosive.

When located outdoors or in unheated sections of buildings, soda-acid extinguishers must be protected against freezing. Authorities state implicitly that no substance should be added to the liquid in an attempt to prevent freezing. Simple, tight cabinets heated by an electric light bulb are recommended by the National Fire Protection Association.

Freezing of the water content subjects the soda-acid extinguisher cylinder to strain which weakens it so that it may not resist normal operating pressure of about 90 p.s.i The necessity for protecting this device in cold weather makes its all-round utility in most cement plants questionable. Power interruptions in case of storm may cause failure of the electric heating system and irreparable damage to the extinguishers, robbing the plant of fire protection when it may be most needed. Attempts to repair damaged extinguisher cylinders by soldering have proved disastrous to subsequent users. Electric heaters, designed to support chemical extinguishers, are not recommended because defective thermostats may cause excessive heating which would decompose the sodium-bicarbonate solution, and because the heaters may collect dust or be appropriated by employes as electric stoves.

Conversion of soda-acid extinguishers to non-freezing by filling with calcium chloride solution and replacing acid bottle and cage with a "conversion unit" is not recommended by the Inspection Department of Associated Factory Mutual Fire Insurance Companies, but it is said to be satisfactory if the alteration is made by a properly qualified manufacturer. The conversion unit consists of a carbon dioxide cartridge together with a holder equipped with a discharging pin.

Non-freezing extinguishers are preferable for use where possibility of freezing temperatures makes use of soda-acid extinguishers inadvisable. They are designed for use on any type of fire which can be controlled by a soda-acid extinguisher. The solution will not freeze even at temperatures as low as 40 deg. F. below zero, and in some types the extinguishing action is greater than in ordinary soda-acid type. Liquid is discharged either by pressure devel-

FIRE EXTINGUISHER CHART NO. 1—TYPES, SPECIFICATIONS, ADVANTAGES, LIMITATIONS

TYPE			NON-FREEZING		FOAM	VAPORIZING LIQUID		CARBON DIOXIDE
OPERATION			Invert	Invert	Invert	Pump	Pull Lever	Open Valve
DISCHARGE			Chemical Reaction	Gas Pressure	Chemical Reaction	Pumping Action	Stored Air Pressure	Pressure Stored in Cylinder
EFFECTIVE RANGE			40 to 50 ft.	45 to 55 ft.	35 to 40 ft.	20 to 25 ft.	30 to 40 ft.	6 to 8 ft.
COMMON SIZE			2½ gal.	2½ gal.	2½ gal.	1 qt.	1 gal.	15 lb.
PRINCIPAL AGENT			Liquid	Liquid	Fire Foam	Free Gas	Free Gas	Free Gas
EXTINGUISHING EFFECT			Cooling	Cooling	Blanketing	Smothering	Smothering	Smothering
ADAPTABILITY OF EXTINGUISHERS ON VARIOUS TYPES OF FIRES	CLASS A FIRES	Wood, Textiles, Rubbish	Best available in places not involving oils, greases.	Best available in places not involving oils, greases in any way.	Good only for surface fires; small wetting, penetrating effect.	Other types are better adapted. Good only under most favorable conditions.	Other types are better adapted. Good only under most favorable conditions.	Other types are better adapted. Good only under most favorable conditions.
	CLASS B FIRES	Oils, Greases, Flammable Liquids	Should not be used; has practically no blanketing effect. Might spread fire.	Should not be used; has practically no blanketing effect. Might spread fire.	Best in closed or protected areas because of blanketing.	Good only under most favorable conditions; small size, difficult to confine gas.	Good only under most favorable conditions; difficult to confine gas at seat of fire.	Best for gasoline motors, machine framework, under drafty conditions.
	CLASS C FIRES	Electrical Equipment	Should not be used; stream is a conductor of electricity.	Should not be used; stream is a conductor of electricity.	Use where fires have spread beyond capacity of other extinguishers and current is off.	Stream is non-conductor of electricity, good where fires have not spread beyond capacity of extinguisher.	Stream is a non-conductor of electricity, good where fires have not spread beyond capacity of extinguisher.	Best available: non-conductor, no wetting nor solvent effect, non-corrosive and leaves no residue.
	NO CLASS DESIGNATION	Automobiles, Trucks	Should not be used; not splash-proof, no blanketing effect, size unsuitable.	Should not be used; not splash-proof, no blanketing effect, size unsuitable.	Size unsuitable. Needs protection against freezing.	One of best available, because of smothering effect, size, resistance to freezing.	Good because of smothering effect, resistance to freezing.	One of best available, because of smothering effect, resistance to freezing. Non-corrosive.

oped by chemical reaction or by stored gas pressure.

Non-freezing extinguishers are in general more complicated and more expensive than the soda-acid type, and some are slightly more difficult to recharge. Solutions are good conductors of electricity and should be used only on dead electrical equipment and then only if carbon tetrachloride or carbon dioxide are not available or prove ineffective.

Class B Fires

Oils, greases and flammable liquids come under the classification of class B fires. Foam extinguishers are similar in outward appearance to the hand-size soda-acid and non-freezing extinguishers and operated similarly, by inverting. The foam consists of small bubbles containing carbon dioxide and is about 7½ to 8½ times the volume of the original solutions, forms a tight flexible blanket which excludes air and extinguishes the fire.

A blanket of foam floats on most liquid surfaces, persists for some time and prevents re-ignition of the fire from outside sources. This extinguisher is useful for fires involving hazardous liquids in tanks or vessels, and on floors or machinery.

The effectiveness of foam is reduced when applied to certain liquids such as boiling linseed oil. It is not as well adapted to deep-seated fires in ordinary combustible materials such as cement sacks as is water because the foam does not penetrate as well as water. Foam is a good conductor of electricity; the residue is somewhat corrosive.

Foam extinguishers must, like soda-acid, be protected from freezing in tight cabinets and should be heated as recommended. Chemicals should not be added to lower the freezing point of foam solutions since foreign chemicals may adversely affect the volume and quality of the foam produced.

Vaporizing liquid extinguishers utilize a special vaporizing non-conducting liquid having carbon tetrachloride as its base. The solution forms a heavy inert gas which envelops the burning material, excludes air and extinguishes the fire. It is a non-conductor and can be used on fires in electrical apparatus of 33,000 volts without danger to the operator.

These extinguishers are of limited capacity, and do not have as much quenching effect as water or soda-acid solutions, and the gases which perform the extinguishing action are easily dissipated by drafts. Operators should avoid exposure to smoke and fumes liberated and produced. These extinguishers should be kept constantly filled with only the special extinguisher carbon tetrachloride supplied by extinguisher manufacturers to avoid condensation of moisture from the air. To discourage use by employes for cleaning purposes, extinguishers should be placed in tamper-proof metal boxes with glass fronts or dye should be added to the fluid.

Carbon dioxide has many advantages over other extinguishing agents for fires in automobiles and trucks, laboratories, electrical equipment and small amounts of flammable liquids including those like alcohol which break down foam. It is non-injurious, non-corrosive, a non-conductor of electricity, non-freezing, unaffected by temperature changes and does not deteriorate with age.

Effective Range of Carbon Dioxide Extinguishers

Combined discharge of these extinguishers has an effective range of 2 to 8 ft. and a continuous discharge of from 15 to 110 seconds, depending on the size of extinguisher. Discharge produces a local high concentration of inert gas which displaces the air and extinguishes the fire. Objects can be coated with cold snow (—110 deg. F.) so as to produce a temporary chilling blanket which aids in extinguishing small spots of glowing material. The extinguisher may be discharged intermittently.

While this type of extinguisher can be used on fires in ordinary combustible material, it is not dependable for deep-seated or smoldering fires because it has none of the wetting action and relatively little of the cooling action of water. Its use must be confined to moderately small fires because of limited range and short duration of discharge, and extinguishers of ample capacity should be selected for the hazard to be protected. Operators and others should avoid exposure to smoke and fumes liberated or produced.

(To be continued)

Under Water Screening

(Continued from page 29)

sump. Throughs are split to the hydroseparators which are set to reject approximately minus 100-mesh slimes, depending upon the clay content, which also enter the debris sump.

Underflows from each hydroseparator are handled into either of two 1200-ton feed storage tanks or 600-ton feed tanks by separate pumps, one Georgia and one Wilfley. One of the pumps is connected up to transfer from either storage tank to either feed tank. From the feed tanks, material discharges by gravity into a sump and a 6-in. Wilfley pump feeds it into the three sizers.

A separation is made, usually at 20-mesh, plus 20-mesh being fed to two 4- x 5-ft. Link-Belt vibrating screens by a 4-in. Wilfley pump. These two screens have 20-mesh cloth, oversize entering a bin and undersize joining the 20- to 48-mesh fraction from the sizer in a 6-ft. Dorr rake classifier. The finest fractions, minus 48-mesh, are put into a 20-ft. Dorr bowl classifier with a 12-ft. rake, and are the feed for the straight flotation process. Overflow from the 6-ft. rake returns into the sump from which the sizers are fed.

Each of the classifiers discharges a dewatered product to a separate belt conveyor which empties into a regulating bin of 250 tons capacity, that has enough elevation to drain off some excess water.

In the next operating step, the mixing of reagents, it is desirable to hold down the water content. Each side of the bin was therefore provided with a variable-speed 7-in. Redler elevator, to feed out material to a belt conveyor which carries the materials to vertical shaft mixers where flotation reagents are added. These reagents, consist of varying amounts of caustic soda, crude oil, fatty acids and resin.

The reagent mixer in the bowl classifier circuit (straight flotation) discharges into Minerals Separation counter-current flotation machines, and the recovered product is transferred by a 4-in. Wilfley pump into 300-ton concentrate tanks.

In the other circuit, screen boxes are used to split the material into fine and coarse fractions, and the agglomerate tailings are mixed with flotation feed just prior to the feed's entering the mixers in which the reagents are added for flotation. Concentrates go to the cleaner cells and are then pumped into steel tanks.

Each of the five concentrate tanks is located adjacent to the railroad tracks for direct car loading and has filter panels to drain off water for at least three hours before loading.

The plant utilizes 9000 to 10,000 g.p.m. of water. Water is supplied from two wells by Layne and Bowler deep well pumps at the rate of 6000 g.p.m., and after passing through the plant processing is settled and reused. The washing plant is supplied by a 2000 g.p.m. Allis-Chalmers water pump and one of 3000 g.p.m. For the flotation plant, an Allis-Chalmers pump supplies 5000 g.p.m.

G. H. McCoy is manager of the plant; D. M. Wright, superintendent; and W. D. Calverley, engineer.

LETTERS TO THE EDITOR

Los Angeles Rattler Test

THE EDITOR:

Indicative of the fact that "It is an ill wind that blows nobody good," upon receiving inquiry as to some things I am supposed to have said in addressing the National Crushed Stone Association at St. Louis, I renewed my subscription to ROCK PRODUCTS and have just received the February, 1940, issue. In the last paragraph of the first column on page 52 the following thought is attributed to me:

"On the subject of testing, Mr. Litehiser seemed to favor the Los Angeles rattler test for soundness in preference to the sodium sulphate test, which would have resulted in the rejection of some aggregates that have given good experience."

In order that you may know the full text of my remarks on this subject, a copy of that portion of my paper is enclosed. Upon reading it, I would appreciate very much your including some notice of correction in the next issue of ROCK PRODUCTS.

R. R. LITEHISER,
Ch. Engr., Bureau of Tests,
State of Ohio, Dept. of Highways.

The following is quoted from Mr. Litehiser's remarks:

"Both aggregate producers and testing engineers have had particular interest during the past five years in the Los Angeles abrasion test and in the soundness test by use of sodium sulphate or magnesium sulphate. Of the two, the Los Angeles abrasion test appears to be the more promising working tool. It provides an index to the ability of an aggregate to withstand impact as well as abrasion, which alone was measured in the Deval abrasion test, which has been in use for many years.

"Recognizing the deficiency in the Deval abrasion test, A. S. Rea, who was Ohio's Testing Engineer for 20 years preceding his death in 1930, had introduced what we call the "Modified Abrasion Test" for use on crushed stone, slag, and gravel alike. The test is essentially the Deval test for gravel, in which a charge of 6 cast iron spheres weighing approximately 0.95 lb. each is placed in the cylinder with the aggregate as an abrasive charge. Since the introduction of the Los Angeles abrasion test, our laboratory has made approximately 150 such tests on commercial aggregate from representative sources throughout the State in an effort to establish a conversion factor between our present specification limits, expressed in terms of the Modified abrasion test, and the corresponding limits expressed in terms of the results of the Los Angeles test. These tests indicate that for our hardest grade of aggregate, which has an upper limit of 18 percent as determined in the Modified abrasion test, that the corresponding limit with the Los Angeles abrasion test should be about 25 percent. For our next grade of aggregate, which is that used in all surface courses, the Modified abrasion limit is 24 percent and the corresponding limit using the Los Angeles abrasion test appears to be about 35 percent. For our third grade of aggregate, which is used in all base course work, our specifications establish a limit of 32 percent using the Modified abrasion test, where the corresponding limit using the Los Angeles abrasion test seems to be about 45 percent. We recognize that our data are limited and therefore too much weight should not be given to the fact that our tests indicate lower limits in terms of the Los Angeles abrasion test, than are in use where aggregate specifications already include this test.

"Turning now to the soundness test, inasmuch as tonnage, in which aggregate producers are fundamentally interested, bears such a definite relation to the satisfactoriness which aggregate gives in service, I believe I can safely assume that aggregate producers are just as interested as those who build their highways and bridges with such aggregate in the form of portland cement concrete, in furnishing aggregate which will contribute its part toward the durability, as well as toward the structural strength, of those highways and bridges.

"In an effort to assist themselves in determining in advance whether an aggregate will contribute durability to the concrete in which it is used, engineers devised the soundness test using sodium sulphate or magnesium sulphate. Sincere use of this test on the part of engineers has undoubtedly resulted in the rejection of some aggregate, which might have made satisfactory concrete. However, as stated in most present day specifications, the soundness test, using sodium sulphate or magnesium sulphate, is recognized only as a guide in selecting aggregate and the service record of concrete in which the particular aggregate has been used is also taken into consideration. Where such use is made of the soundness test, I personally consider it a worthwhile working tool in a testing laboratory, charged with the responsibility of obtaining a satisfactory material with which to build.

"It may be that the freeze and thaw test, which many laboratories, including our own, are using experimentally in an attempt to find a more satisfactory working tool with which to determine the effect on durability of a particular aggregate, will prove more satisfactory, inasmuch as it employs directly the same factors which are at work in nature in deteriorating any structural body in which they can gain a foothold. However, the freeze and thaw test at best takes considerable time, and does not offer much promise as a routine test for acceptance or rejection of aggregate."

"You Got Us Wrong"

THE EDITOR:

In your review of Bureau of Mines Reports of Investigations Nos. 3461 and 3467, ROCK PRODUCTS, March issue, you have made some observations which cast doubt on the fairness of the time studies and subsequent analyses. In others, your criticism indicates a lack of understanding of the analyses. Both Mr. Lintner and I welcome criticism but we wish to point out certain errors in your comments that we feel leave a wrong impression in the minds of your readers.

I quote from your review as follows:

(1) Paragraph 2, p. 44. "It is open to doubt if the data (obtained from a single day's stop watch observations) are a fair criterion of any one of the quarry operations."

The authors admit this to some extent in the last paragraph, p. 2 in R.I.3461 and in par. 2, p. 2, R.I.3467. Quoting from the prior publication, we said, "In each instance, however, the test period selected was one in which operations could be expected to proceed in the normal manner. Occasionally, after the test was begun, conditions changed unavoidably and normal procedure was disrupted. Such studies were discarded."

We are fully aware of the difficulty of relating time studies for a single shift to a full season's operation, but we see no reason to doubt that a test conducted under normal operating conditions for a shift should not be indicative of average conditions for the season.

(2) Par. 3, p. 44. " . . . which apparently makes the report a fair 'Gallup poll' of the industry as a whole."

The authors do not consider the analysis of these 21 quarry studies as a "Gallup poll." The two papers under discussion are "progress reports" only and are so titled. Quoting from par. 2, p. 2, R.I.3461: "Although the study will be continued in the future, it was decided that as data of sufcient interest were accumulated, they would be published as progress reports."

Since publication of these reports, other quarries have been studied and still others are under study at the present time. When sufficient additional data are acquired, further progress reports will be issued.

(3) "It is obvious, of course, that the relative lengths of those delays would vary considerably in the different quarries from day to day."

If you will delete the word "considerably," we will agree. However, it is far more probable that a reduction in delay for one cause would be accompanied by an increased delay for another cause in the same quarry and that the total of all delays would tend to balance from day to day.

(4) Explanation under chart "Handling boulders means the jiggling around to get over-size boulders in or out of the dipper . . . "

The term used in the text is "Moving boulders" and is specifically defined in paragraph 2, page 6, R.I.3461, as "This item covers the time spent by the shovel in setting boulders aside for later secondary blasting that are too large for the shovel dipper, haulage equipment or crusher to handle."

We submit your definition is erroneous and not in conformity with the text.

(5) Page 45, under "Time Efficiency," " . . . if the truth were known, probably the quarry management was reluctant . . . to spend money for extra equipment and extra labor to operate it merely to keep shovels busy producing stone which could not be marketed. That illustrates another reason why this report may not be a very accurate measure of quarry operating efficiency."

The above quoted comment indicates its author has missed entirely the objective of these time studies. At no place in either paper have figures been set up to indicate "quarry operating efficiency." Instead, it is specifically stated that the studies are directed solely to either the loading process or quarry haulage. To illustrate, I quote from the text of R.I. 3461, p. 2, 4th paragraph, under the heading "Object of Study." "In this, the first progress report of these studies, analyses have been confined to the process of loading stone at the quarry face by power shovels." From paragraph 4, p. 20, "Hence a complete analysis must consider the interrelation of all processes. This study, however, does not include an analysis of the haulage process as such nor of crusher capacity."

Refer also to paragraph 2, page 24, which further limits the scope of the paper.

R.I.3467, p. 1, under "Object of Study," "This report deals with the methods used in transporting rock from the loading shovel to the crusher at 21 quarries."

It certainly would be poor economy and decidedly inefficient "to spend money for extra equipment and labor merely for the purpose of keeping the shovel busy producing stone which could not be marketed." The authors did not and do not advocate this. The reference to provision of adequate haulage units for shovel equipment was made in discussing shovel loading only and had no reference to efficiency of the quarry operation as a whole. Refer to last paragraph, p. 19, R.I.3461, "Since it is possible (although, perhaps, not economical) to eliminate this type of delay entirely, by having enough haulage equipment available to service the shovel at all times, this method of basing calculations has substantial support."

(6) Last sentence, column 1, page 45, your review. "It takes volume production to get real efficiency." Does "volume production" refer to maximum capacity and, if so, to capacity of what? The shovel? The haulage system? The initial crusher? The screening plant? Or the entire quarry operation? It is rare, indeed, where the quarry design involves equal maximum capacities for each process. Where unequal, volume production must then refer to that process having the smallest maximum capacity. It is entirely possible that in many of the quarries studied, the crusher capacity was less than the shovel capacity. Hence, the shovel must operate inefficiently. This possibility is recognized but is specifically excluded from discussion in both papers.

If "volume production" refers to large tonnage versus small or intermediate sized production, the authors disagree with you. There is no reason why a small plant cannot be run as efficiently as the large one.

In addition to the above, we are intrigued with the last sentence of the first paragraph, column 2, page 45. It is difficult to understand just how you arrive at this conclusion in view of the opening paragraphs contained in both publications under review.

I cannot but feel that you have missed the purpose and limitations of these studies. If you will restudy both papers, keeping in mind their self-imposed limitations, I feel confident you will agree with their authors that your adverse criticisms are unjustified and will want to correct in your columns the erroneous impression they convey.

J. R. THOENEN,
Supervising Engineer,
Nonmetal Mining Section,
Mining Division.

* * *

The editor is properly "spanked" if his comments were taken as critical of the good work or intentions of the authors. He merely wished to emphasize the limitations of these progress reports in *their* criticism of the efficiency of certain parts of quarry operation, if not of the whole operation. We doubt if any reader of the entire reports can fail to get the same impression that they are critical of quarry owners and their methods, whether that was the authors' intent or not.

Probably many quarry owners should justly be criticized for inefficiency, but the editor thought it only fair to them to point out some of the extenuating circumstances not mentioned in the reports.

By volume production the editor meant operating the quarry to somewhere near its maximum capacity. If cost of operation is an index of efficiency, quarry operators know that it makes a lot of difference in unit cost whether a quarry layout that can produce 2000 tons a day is operated to produce 2000 tons, or is operated to produce 1000 tons, which may be all the market calls for. Under the latter condition even greater efficiency is certainly desirable but seldom obtainable.

World's longest belt conveyor crosses rivers, highways and railroads, through extremely rough country, in delivering aggregates to Shasta dam in California. Twenty miles of 36-in. Goodyear rubber belting and 16,000 Chain Belt conveyor idlers make up the conveyor, which is 9.6 miles in length and designed to handle 22,000 tons daily from the producing plant at Redding.

Photograph by courtesy Goodyear Tire and Rubber Co.

The Bureau of Mines is doing a good job for the quarry industry. More power to it.

THE EDITOR.

Agricultural Limestone

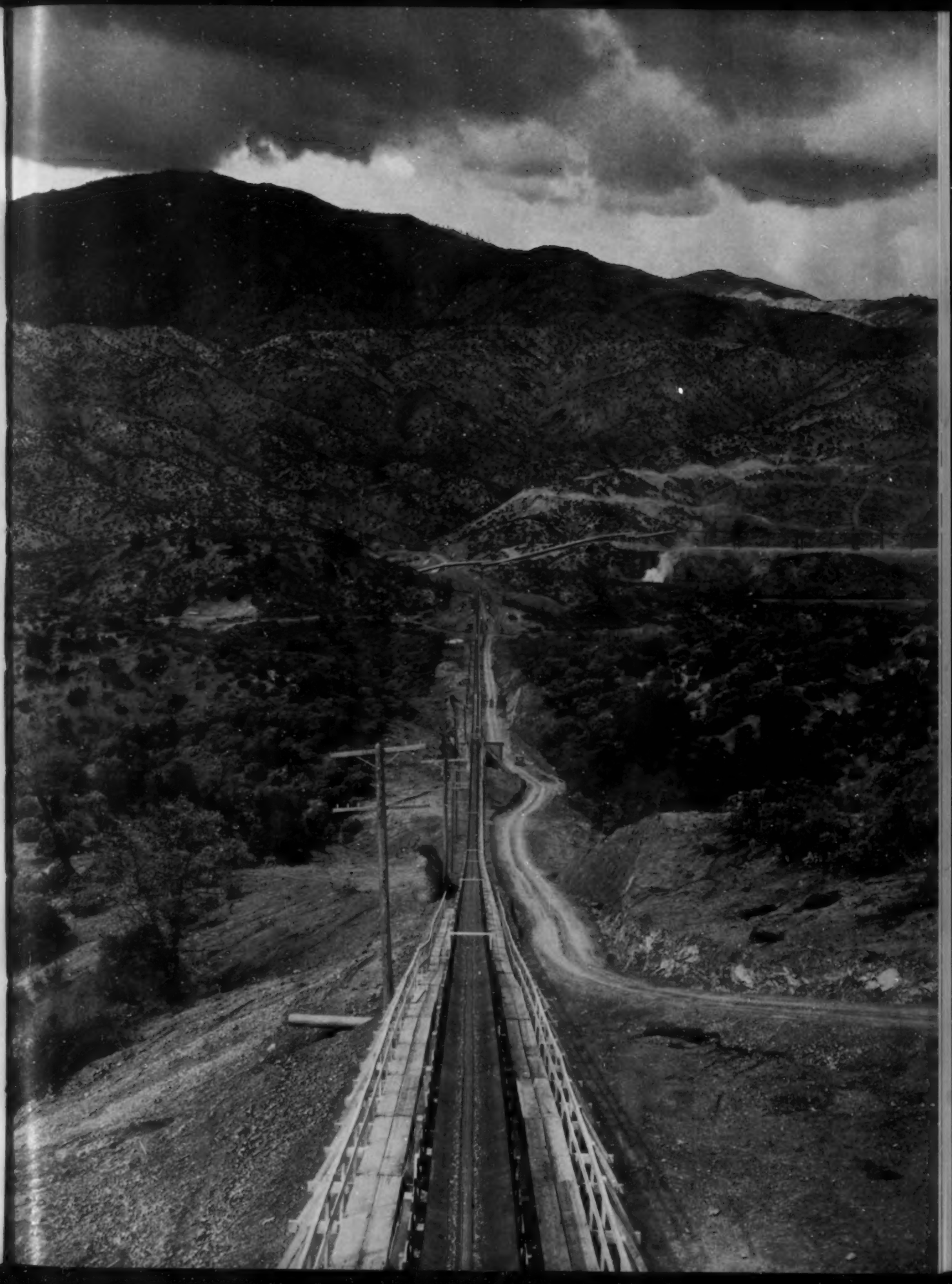
THE EDITOR:

I have just come across a review in the February, 1940 number of ROCK PRODUCTS of my discussion on agricultural limestone at the St. Louis meeting of the National Crushed Stone Association.

On the whole, this review is quite satisfactory, but there are two statements which I should like to correct. The first of these is the last sentence in the second paragraph, reading "a low-grade stone, however fine it is ground, is of no value in liming the soil." This should have read, "No amount of grinding can raise a low-grade agricultural limestone to a high-grade stone."

The other statement is in the middle of the last paragraph, "A product, 80 percent minus 8-mesh will ordinarily give a rating that high," indicating a rating of 90. This should read, "A product 85 percent minus 8-mesh may give a rating as high as 90." The fact is that 85 percent through 8-mesh commercial limestone will give a rating of 90 now and then, but ordinarily the rating will be one or two points below that.

Very truly yours,
E. E. DE TURK,
Prof. Soil Fertility,
University of Illinois.



How To Study Screen Efficiency

ARTICLE FOURTEEN

On sizing, testing and specifying aggregates outlines method of studying capacity and efficiency of plant screening equipment

By ELWOOD T. NETTLETON*

THE WORK of the first two years in a company's testing laboratory, which was under the writer's direction, was designed primarily to find out how well we were meeting various specifications under varying operating conditions; the reasonableness of these specifications; the errors in testing and sampling; and, to a certain degree, the study of segregation and cleanliness.

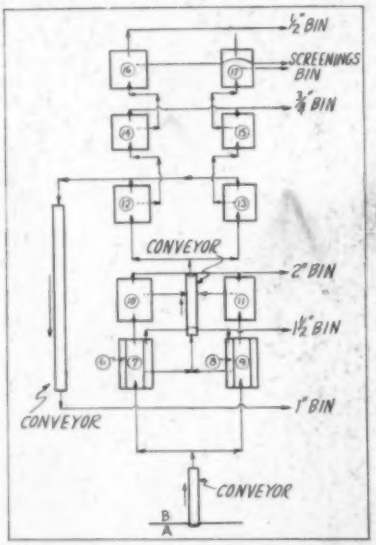
Consequently, any tendencies as to the efficiency of various types of screens, screen material, and load-factor were, one might say, of incidental nature.

Theoretical calculations of screening area, load in tons per hour per square foot of screen area are shown in the table.

Some of the assumptions made here are that the effective area of a revolving screen is 25 percent of its total surface area, and that of a vibrating screen is 100 percent. Neither of these assumptions is absolutely correct. Furthermore, the loads to the screens are assumed constant. There is no question that this factor varies considerably, especially at some plants.

* General Superintendent, L. Suzio Construction Co., L. Suzio Trap Rock Co., The Suzio Trap Rock Co., and the York Hill Trap Rock Quarry Co., Meriden, Conn.

The chief reason for incorporating this preliminary study in this discussion is to show the real necessity for further study of this problem. It is estimated that it would be necessary to divide approximately two months of a man's full time between the laboratory and the individual plants for this purpose. In making this study the openings of the testing screens should be of the same size as the actual quarry screens, rather than openings corresponding to the various specifications.



Flow sheet of screen house equipped with nine trommel screens and eight vibrating screens

Typical Test Results

At the risk of criticism, the writer is listing two examples from the tables, not to prove the correctness of the statements or conclusions in these two examples, but rather to point out what a study of such tables, provided they were more complete, might reveal. It should give valuable information to a producer, concerning the purchase of screens, screen materials, efficiency of plants, possible redesign or increases in screening area.

(1) 2-IN. STONE: QUARRY No. 1 AND QUARRY No. 6

Screen openings both passing and retaining are the same. Screen material the same.

No. 1 Vibrating 4.16 tons per sq. ft. of surface. Passing 1½-in. = 26.0 percent.

No. 6 Revolving 3.12 tons per sq. ft. of surface. Passing 1½-in. = 35.5 percent.

TABLE OF SCREEN DATA FOR ANALYZING SCREENING EFFICIENCY

Screens							Stroke or R.P.M.	Slope	Screening Area		Tonnage Required	Tons per sq. ft.
No.	Type	Size or Diam.	Material	Original Size Opng.	Condt.	Length			Total	Effective		
1	Trommel	94 in.	Mn.	2¾ in. round	Good	12 ft.	15	1 in. per ft.	293 sq. ft.	73 sq. ft.	330	4.54
2	Trommel	80 in.	Mn.	4 in.-6 in. round	Poor	15 ft.	15	1 in. per ft.	315 sq. ft.	79 sq. ft.	550	6.96
3	Trommel	60 in.	Mn.	2¾ in. round	Worn	15 ft.	15	1 in. per ft.	236 sq. ft.	59 sq. ft.	175	2.97
4	Trommel	60 in.	Mn.	2¾ in. round	Worn	15 ft.	15	1 in. per ft.	236 sq. ft.	59 sq. ft.	175	2.97
5	Trommel	48 in.	Mn.	2⅜-½ in. round	Fair	13 ft. 6 in.	15	1 in. per ft.	170 sq. ft.	43 sq. ft.	—	—
6	Trommel	72 in.	Chilled B.P.	1½ in. square*	Good	18 ft.	15	30 deg.	340 sq. ft.	85 sq. ft.	220	2.59
7	Trommel	60 in.	Chilled B.P.	2 in. square	Worn	18 ft.	15	30 deg.	283 sq. ft.	71 sq. ft.	275	3.88
8	Trommel	72 in.	Chilled B.P.	1½ in. square	Good	18 ft.	15	30 deg.	340 sq. ft.	85 sq. ft.	220	2.59
9	Trommel	60 in.	Chilled B.P.	2 in. square	Worn	18 ft.	15	30 deg.	283 sq. ft.	71 sq. ft.	275	3.88
10	Vibrating	3x6 ft.	Mn.	1½ in. square	Good	—	750	30 deg.	18	18	55	3.05
11	Vibrating	4x5 ft.	Mn.	1¾ in square	Good	—	750	30 deg.	20	20	55	2.75
12	Vibrating	5x12 ft.	Mn.	1 in. square	Good	—	750	30 deg.	60	60	115	1.92
13	Vibrating	5x12 ft.	Mn.	1 in. square	Good	—	750	30 deg.	60	60	115	1.92
14	Vibrating	5x12 ft.	Mn.	⅝ in. square	Good	—	750	30 deg.	60	60	100	1.67
15	Vibrating	5x12 ft.	Mn.	⅝ in square	Good	—	750	30 deg.	60	60	100	1.67
16	Vibrating	4x8½ ft.	Mn.	3/16 in.x¾ in.	Good	—	750	30 deg.	34	34	65	1.91
17	Vibrating	4x8½ ft.	Mn.	3/16 in.x¾ in.**	Good	—	750	30 deg.	34	34	65	1.91

*One Section of 1⅜ square mesh.

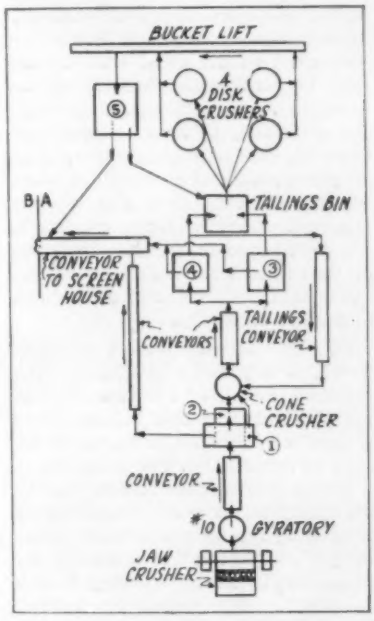
**Lowest 1/3 of screen turned opposite way.

Other things being equal, this would tend to show that a vibrating screen, even with a 33 percent greater load per effective sq. ft. of screen surface, eliminated 9.5 percent more of the fines based on a total of the whole product, or was (35.5—26.0)/35.5=26.7 percent more efficient.

(2) 2-IN. STONE: QUARRY No. 3 and QUARRY No. 4

Screen openings both passing and retaining are exactly the same. Screen material and the type of screen are the same.

Difference is only in the load factor or tons per square foot of surface.



Flow and screen sheet for crusher house equipped with jaw, gyratory, cone and disc types of crushers

No. 3 Revolving 2.38 tons per sq. ft. of surface. Passing 1½-in. — 18.5 percent.

No. 4 Revolving 3.20 tons per sq. ft. of surface. Passing 1½-in. = 33.5 percent.

Other things being equal, this would tend to show that the increase from 2.38 tons per sq. ft. to 3.20 tons per sq. ft. crowds the screens and prevents proper screening, almost doubling the amount of fines in the product.

Numerous other scattered examples could be picked out from the tables, but, as stated above, the propriety of including them at this time without further tests, study, and research is very questionable.

A sample table of data used accompanies this article.

(To be continued)

JOINT LABOR CONTRACTS

ONE OF THE SUBJECTS which aroused the most interest at the January conventions of the National Sand and Gravel Association and the National Ready Mixed Concrete Association was that which dealt practically with labor relations as in the case of uniform labor contracts. ROCK PRODUCTS first called attention to these in the December, 1938 issue in which was published an abstract of the contract entered into by the Rock, Sand and Gravel Producers' Association of Northern California and seven A. F. of L. unions. This is a single contract, simply worded and exceedingly brief, signed by the Association officers on behalf of its members and the heads, or contracting officers, of all the various unions.

Somewhat similar methods are employed by the sand, gravel and ready-mixed concrete producers in western Pennsylvania. These were described briefly by Ray V. Warren, secretary and engineer of the Western Pennsylvania Sand and Gravel Association at the recent convention. The Pennsylvania method differs from the one used in northern California in that there are three separate contracts with as many A. F. of L. unions, and instead of the Association being the contracting party each of the producers is a separate and joint party to each of these uniform contracts.

Therefore, some of the advantages of the California contract which were discussed editorially in the December, 1938 issue do not pertain to the Pennsylvania contract, although both have beneficial results in putting all the competitors on the same labor cost basis. The Association secretary for the Pennsylvania producers was instrumental in drafting and getting signed the joint contract, and he serves unofficially as a go-between and conciliator between the unions and the producers, but he is not a signer for the contracting party as in the case of W. W. Dennis, secretary of the Rock, Sand and Gravel Producers' Association of Northern California.

The Pennsylvania contracts are with the locals of the International Union of Operating Engineers, the Construction Materials Supply and General Laborers, and the International Brotherhood of Teamsters, Chauffeurs, Stablemen and Helpers of America. The contracts vary considerably, which makes the situation considerably more complicated.

The Chauffeurs' contract calls for a 48-hour week with time-and-a-half for overtime (no limit), double time for any employment on Sundays or holidays; one week's vacation with pay, pay from the time of reporting, with a minimum of two hours' pay if no work is assigned. The following provisions may be found particularly interesting as they cover those things often found most troublesome:

ARTICLE 5.

(a) The Employers retain the right to discharge any employe, but upon the request of the Union, they shall agree to show cause for such discharge. If satisfactory cause cannot be shown the discharged employe shall be reinstated and shall be paid at his regular rate of pay for all time lost. Dishonesty or drunkenness, and the drinking of alcoholic beverages during working hours shall be just cause for immediate dismissal.

ARTICLE 6.

(a) The Employers agree when hiring additional trucks to hire only trucks of such companies as employ members of the Union. The Union agrees to make every effort to see that its members who are in the Employer's employ obey all reasonable rules and regulations laid down by the Employers.

(b) The Employers agree that none of their employes will be asked to enter into a written or verbal contract, the provisions of which will be inconsistent with any of the provisions of this agreement.

(c) This agreement shall bind all subcontractors working for the Employer. The Employer, when sub-letting any of his work must sub-let same subject to the terms and conditions of this agreement.

(d) Provided the terms of this agreement are complied with, materials may be delivered to any buyer in the absence of labor trouble in plant or yard at place of delivery or sale; however, it shall not be deemed a breach of this contract to refuse to work on, or haul to or from any place where there is any labor trouble. The term "labor trouble" meaning a cessation of work on a building or construction project, a strike of the Employees, or a lockout on the part of the Employer.

The contract with the operating engineers' union is short and simply worded, but required several pages of interpretations. One of these requires a closed shop insofar as operations requiring this craft are concerned. In this contract only a 44-hour week is permissible. Engineers on cranes, derricks, central mixed concrete plants, etc., are paid on a 44-hour week basis, not to include holidays, for the calendar months April to November, inclusive, and a minimum weekly allowance of three days or 24 hours for the calendar months December to March, inclusive. All overtime is at the rate of time-and-a-half, including Sundays and holidays, except Labor day, when there can be no work.

The producer must cease deliveries, on notification by the union of any labor trouble at the point of delivery.

The contract with the common laborers union (Construction Materials Supply and General Laborers) provides for a 48-hour week, with double time for Sundays and holidays.

Fluxes and Their Influence on Burning Clinker

Introduction to a study on the reactions of various raw materials in different kiln systems, with and without fluxes

By STEVEN GOTTLIEB*

MAJOR HUTTON'S article on "Fluxes in Cement Mixes" in the November, 1939, issue of ROCK PRODUCTS, p. 51, leads me to add my own observations on this subject. These observations are based on many years of experience in studying the reactions of different raw materials in various kiln systems with and without fluxes both in actual practice and in laboratory experiments.

The effect on the formation of clinker constituents in burning due to changes in the chemical composition, are well known from the studies of the quaternary system[1] CaO-SiO_2-Al_2O_3-Fe_2O_3 and the systems subsequently formed at higher temperatires, CaO-$2CaO.SiO_2$-$5CaO.3Al_2O_3$-$4CaO.Al_2O_3.Fe_2O_3$, etc. Recent research[2] also adds much to the part played by the alkalis. We cannot, then, be said to be in the dark as to the influence of chemical composition on the formation of the clinker constituents at different burning temperatures.[3]

Chemical reactions between solid substances, even when they are very intimately mixed, tend to proceed only slowly. When heated to higher temperatures, a stage must be reached at which the atom or molecule groups increase the speed of their movements to such an extent that they are capable of "interchanging," i.e., they oscillate so strongly around their lattice points that a great number of them change places.[4] With silicates, a considerably greater rigidity of the lattice-structure must be overcome than in the case of most other substances, in order to achieve this greater activity. According to latest experience,[5] however, that rigidity is not equal in all places, the lattice-structure being interspersed with numerous sub-microscopic faults ("lattice wounds"). The ions found in such faulty places are less fixed than the inner ones of the crystal, and therefore are subject to greater reactivity.

By the application of suitable fluxes, it is possible to diminish the reaction inertia of silicates even at the short heating and cooling times of practice, and thus to approach the state of equilibrium. The structure of a highly polymerized lattice (e.g. in the glassy state) can be loosened by some flux, resulting in greater reactivity. Thus the formation of $3CaO.SiO_2$ at above 2400 deg. F. can be greatly accelerated by adding CaF_2 to the raw mix. $MgSiF_6$ operates in a similar way.[6] The fluxes act in these cases as mineralizers; those fluxes with small ions carrying high electric charges being the most active. The fluorine ion disintegrates the complex SiF_4 ion. The SiO_4 and SiF_4 ions brought about by such decomposition interchange to form a homogeneous equilibrium, in nearly the same way as in quite a number of heterogeneous catalytic processes.[7] Fluorides exercise a mineralizing influence on aluminate systems, just as in the case of silicate systems.[8]

Admixtures of Fe_2O_3 and Al_2O_3 are often used to lower the silica modulus of the raw material, and are frequently added even to raw mixes that have chemical compositions quite perfect without them, with the view to improving yield, heat economy and quality of production in the case of raw materials "difficult to burn."[9] The use of the term "difficult to burn," which suggests to most ce-

*Chief Chemist, The Portland Cement Co., "Nesher" Ltd., Haifa, Palestine.

	PLANT No. 1		PLANT No. 2	
	Raw Mix (Percentages)	Clinker (Percentages)	Raw Mix (Percentages)	Clinker (Percentages)
Residue on Sieve No. 72 (>200μ)	0.8	....	0.4	....
" " " " 170 (>88μ)	19.0	....	16.0	....
SiO_2	13.10	21.62	13.65	21.64
Al_2O_3	4.00	6.94	3.99	6.80
Fe_2O_3	1.52	2.65	1.67	2.88
CaO	43.71	67.10	44.90	66.30
MgO	0.70	1.08	0.50	0.70
SO_3	Traces	0.16	Traces	Traces
Alkalies	0.12	0.21	0.10	Traces
Ignition loss	36.80	0.20	35.20	1.60
Free lime	....	0.35	....	2.90

	Plant No. 1	Plant No. 2
Fineness: Weight per litre	980 gr.	950 gr.
Residue on Sieve No. 72 >210μ	0	0
" " " No. 170 > 88μ	5 percent	4.5 percent
" " " No. 240 > 65μ	12 "	9.8 "
Setting time: Water used for plastic consistency	26 "	27.5 "
Initial setting at 65 deg. F.	2 hr.	1 hr. 20 min.
Final " " "	3 hr.	3 hr.
Soundness: Lechatelier test	0 mm.	5 mm.
Tensile strength (mortar with 8 percent water) After 1 day at 65 deg. F.	227 lb./in.²	212 lb./in.²
" 3 days	420 "	294 "
" 7 "	483 "	345 "
Crushing strength (mortar with 8 percent water) After 1 day at 65 deg. F.	1700 "	852 "
" 3 days	4960 "	2990 "
" 7 "	6245 "	4405 "

15.2 percent coke (clinker) used; output per kiln 700 bbl./24 hr. in plant No. 1
20.6 percent coke (clinker) used; output per kiln 500 bbl./24 hr. in plant No. 2

Table 1: Properties of cements from both plants, ground in compound mills of the same type (each with 5 compartments) with the addition of 4 percent gypsum

ment experts a well known peculiarity of some raw materials, proves that Fe_2O_3 and Al_2O_3 as fluxes can show various results dependent on the physico-chemical state of the raw materials and the kiln system adopted.

Experience with Modern Shaft Kilns

In two plants belonging to the same concern, up-to-date automatic shaft kilns were in operation. For some time the modern rotary kiln had seemingly supplanted the automatic shaft kiln. Recently the latter has undergone such a remarkable improvement that today it can be considered an automatic burning machine on a par with the rotary kiln. The raw mix is pneumatically blended to any desired chemical composition, then mixed with the necessary quantity of coke or anthracite dust and water and pressed into small briquettes. Feeding the kiln with briquettes and discharging the clinker through the rotary grate are done entirely automatically and can be electrically regulated from the kiln floor, where combustion air is equally controllable.

The kilns in both plants were fired with the same fuel (a 12,600 B.t.u. coke was used). Burning and yield, however, were quite different. In plant No. 1 there were no difficulties in burning the raw mix, production went on smoothly, heat consumption and capacity being very favorable and the produced clinker of high quality. In plant No. 2 the results were less successful. Losses in edge fire, flaws in the middle, etc., frequently occurred and heat consumption and kiln output were unfavorable. Considerable quantities of insufficiently burned clinker were produced.

Milling and blending of raw mix, the admixture of coke, checking, etc., were carried out in an identical manner in both plants, so that the composition of raw mix and briquettes could not be held responsible for the difference in economy of the two plants. This difference can therefore only be due to the various properties of the individual raw materials of which the raw mixes were composed. Plant No. 1 used soft marl of a very hygroscopic nature where the water content fluctuated between 15-20 percent according to the humidity. The raw mix was obtained by mixing high and low calciferous marls. The raw material of plant No. 2 consisted of shale and hard limestone rock in which lumps of SiO_2 were interspersed. It was possible to keep the raw mix in both plants at the same chemical composition.

	1 percent CaF_2 medium burned	1 percent CaF_2 strongly burned	1 percent bauxite	1 percent Fe_2O_3
Fineness: Weight per litre	940 gr.	960 gr.	975 gr.	960 gr.
Residue on Sieve No. 72 >210μ	0 percent	0 percent	0.1 percent	0 percent
Residue on Sieve No. 170 >88μ	3.8 "	4.0 "	4.2 "	4.0 "
Residue on Sieve No. 240 >65μ	10.0 "	10.0 "	13.0 "	11.0 "
Setting time: Water used for plastic consistency	27.5 "	27.5 "	26.8 "	26.5 "
Initial set at 65 deg. F.	4 hr.	1 hr.	2 hr.	2 hr.
Final " " " "	7 "	8 hr. 30 min.	3 hr.	3 hr. 30 min.
Soundness: Lechatelier test	0.5 mm.	1.5 mm.	0.5 mm.	0.5 mm.
Tensile strength (mortar with 8 percent water) After 1 day at 65 deg. F.	184 lb./in.²	170 lb./in.²	285 lb./in.²	220 lb./in.²
" 3 days	400 "	327 "	400 "	391 "
" 7 "	512 "	370 "	450 "	495 "
Crushing strength (mortar with 8 percent water) After 1 day at 65 deg. F.	566 "	568 "	1550 "	1100 "
" 3 days	5540 "	3550 "	4400 "	4160 "
" 7 "	6970 "	4410 "	5700 "	5750 "
	17.4% Coke/Clinker; one kiln 617 bbl./24 hr.	19.8% Coke/Clinker; one kiln 587 bbl./24 hr.	20% Coke/Clinker; per kiln 575 bbl./24 hr.	15.3% Coke/Clinker; per kiln 675 bbl./24 hr.

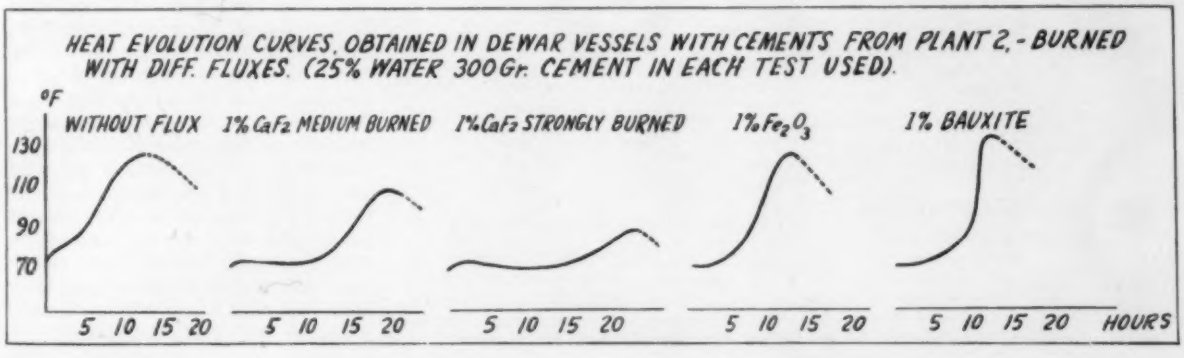
Table 2: Average results obtained by adding fluxes to the raw mix in plant 2

CHEMISTS' CORNER

Problems and practices of the chemists in the industry are discussed on these pages. Contributions and comments are invited.

The drying of raw materials in plant No. 1 consumed more heat due to high moisture, whereas raw grinding in plant No. 2 was more expensive, so that preparation of practically equally fine raw mixes involved nearly the same expenditure. The water consumption of the 2-in. diameter briquettes with which the kilns were fed, amounted to 16 percent and 11.5 percent in plants No. 1 and No. 2 respectively. In spite of the greater amount of water to be evaporated in plant No. 1, the heat required for burning was less than in plant No. 2, the kilns at the same time working at a higher capacity, more uniformly and at a lower fuel consumption (Table 1). Although experiments in grinding a finer raw mix in plant No. 2 caused an increase in water consumption of as much as 18 percent for the briquettes, the plasticity nevertheless became worse and burning was rendered still more difficult.

For the purpose of increasing the capacity in plant No. 2, CaF_2 was



first tried as a flux. In conformity with theoretical expectations burning was rendered much easier, fuel consumption decreased and burning became more uniform. Strength, particularly compressive strength, was considerably increased. A peculiar feature of the setting time of this CaF_2 cement was, that it sometimes showed flash set, with the final set being greatly retarded. The heat evolution during the hardening process which was measured in a Dewar vacuum vessel, 300 grams of cement and 75 grams of water being used, showed by the delayed temperature maxima the peculiarity of this cement which was also noticed in its setting time. It was remarkable that the delay in the setting time was greater when the clinker was sharply burned and the strengths were somewhat lower in comparison with those of the clinkers burned at medium temperatures (about 2500 deg. F.). The clinkers, even when cooled rather fast, showed a good deal of dusting (i.e. "crumbling"). It is possible that CaF_2 as a mineralizer also decomposes $3CaO.SiO_2$ far below its decomposition temperature at a noticeable rate.

Later on, low grade bauxite with an Al_2O_3 content of about 30 percent was tested as flux in plant No. 2. Burning became more uniform, but was far from being satisfactory. Fuel consumption could not be lowered, but the quality of clinker improved. Very good results, however, were achieved with iron oxide. The fuel consumption equalled that of plant No. 1, burning became easy and the capacity was considerably increased. Cement properties and heat evolution curves are shown in table 2 and graph No. 3.

To test the behavior of the raw mix with the addition of fluxes in plant No. 1, an experiment was made with the same iron oxide as used in plant No. 2. Thus the possibility was provided of comparing the raw mixes of both plants again at the same chemical composition but at lower alumina modulus. Iron oxide admixture, however, proved a failure in plant No. 1, although the fuel consumption was still reduced. Burning became exceedingly difficult, the mixture tended to adhere to the firebrick lining and cement strength was lower than when it was burned without iron oxide. On the other hand plant No. 1 reacted favorably to 1 percent bauxite as flux. Fuel consumption was lowered 5 percent and early strength and heat evolution during hardening was getting higher (table 4). However, on account of the chemical resistance against aggressive solutions, especially sulphates, it was not thought advisable to increase the alumina modulus.

This example of practice shows that reports with different results about the behavior of iron oxide, alumina, bauxite, etc., must not be at all contradictory. The effect of different fluxes depends on the chemical composition, the physico-chemical properties of the raw constituents and other local circumstances.

	Without any addition	1 percent Fe_2O_3	1 percent bauxite
Fineness: Weight per litre	980 gr.	975 gr.	990 gr.
Residue on Sieve No. 72 $>210\mu$	0 percent	0 percent	0.2 percent
" " " " $170 > 88\mu$	5 "	4.8 "	5 "
" " " " $240 > 65\mu$	12 "	11.6 "	12.2 "
Setting time: Water used for plastic consistency	26 "	25.8 "	26.2 "
Initial set at 65 deg. F.	2 hr.	2 hr. 10 min.	1 hr. 50 min.
Final " " " "	3 "	3 hr. 20 min.	3 hr. 20 min.
Soundness: Lechatelier test	0 mm.	0 mm.	0 mm.
Tensile strength (mortar with 8 percent water) After 1 day at 65 deg. F.	227 lb./in.^{2}	227 lb./in.^{2}	341 lb./in.^{2}
" 3 days	420 "	415 "	426 "
" 7 "	483 "	472 "	480 "
Crushing strength (mortar with 8 percent water) After 1 day at 65 deg. F.	1700 "	1280 "	2990 "
" 3 days	4960 "	4680 "	4900 "
" 7 "	6245 "	5460 "	5670 "
Constit. compounds of clinkers: $3CaO.SiO_2$	57.5 percent	55.2 percent	55.2 percent
$2CaO.SiO_2$	19.1 "	19.7 "	19.9 "
$3CaO.Al_2O_3$	13.9 "	11.6 "	14.9 "
$4CaO.Al_2O_3.Fe_2O_3$	8.1 "	11.0 "	7.0 "
Free CaO	0.35 "	0.20 "	0.10 "

Table 4: Average results obtained by adding fluxes to the raw mix in plant 1

BIBLOGRAPHY

[1, 2, 3] Rankin, G. A., & Wright F. E., Amer. J. Sci., (4) 139 (1915); Hansen, W. C., Brownmiller, L. T., & Bogue, R. H., J. Amer. Chem. Soc., 48, 1261, (1926); Lea, F. M., and Parker, T. W., Phil. Trans. Roy. Soc. (London), Series A, 234, No. 731 (1934); Lea, F. M. and Parker, T. W., Build. Res. Tech. Paper, No. 16, (1935); Yamauchi, J. Jap. Ceram. Assn., 46, (1938); Insley-McMurdie, U. S. Bur. of Standards, Res. Paper No. 1074; Taylor, Cem. & Lime Manuf., p. 247, 1938; Shipman, Pit & Quarry, July, 1936—Feb., 1937; Dahl, L. A., Rock Products, Sept., 1938—April, 1939; Bogue, R. H. Cem. & Lime Manuf., Oct., 1939—Jan., 1940.

[4] Tammann, Z. f. anorg. Chem., 107 (1919.)

[5] Jander, Z. f. angew. Chem., 686 (1938).

[6] Flint, E. P., Rock Products, October, 1939, p. 40.

[7] Eitel, W., Phys, Chemie der Silicate, 1929.

[8] Eitel, W., Zement, 30, 455-459, 649-672 (1938).

[9] Blank, A. J., Rock Products, May-Sept., 1938 and Koyanagi, K., Rock Products, May 10, 1930, p. 82.

New York State Silicosis Study

FRIEDA S. MILLER, Industrial Commissioner for the Department of Labor, New York State, presented a progress report to the Legislature on the "Detection and Control of Silicosis and Other Occupational Diseases" on March 20, 1940. The Legislature, effective July 1, 1936, had appropriated $50,000 a year for five years for this study and the grant became part of the Labor Law.

Over 4000 plans for ventilating systems and other methods of controlling dusts and fumes have been examined by industrial hygiene engineers, involving 23,446 machines and protecting 39,317 workers. Specifications have been developed for wet and dry drills and exhaust equipment to be used in rock drilling operations.

Four new industrial codes for the enforcement of health standards in dusty trades have been developed thus far. The rock drilling code is in effect and those for foundries, stone-cutting and *stone crushing* are in preparation for promulgation.

The attack on silicosis began with a survey of the 311 foundries in the State. Of 4700 workers X-rayed, 114 were found to be silicotics. After dust control procedures were worked out, the incidence of silicosis was used as a basis for determining workmen's compensation rates to cover claims for silicosis by workmen.

As dust control procedures are developed for the various industries, they are written into industrial codes. In arriving at the code shortly to go into effect for the stone industries, the quarries were classified into two groups. Those where the rock runs uniformly less than 10 percent silica have permissible maximum dust concentrations of 100 million particles per cu. ft. but the maximum is 10 million particles where silica exceeds 10 percent. Most of the quarries in the State have already been classified into one of these groups. Over 1500 dust counts and 2500 rock analyses have been made in the field.

Example of Classifier Design

Article 13 on washing and classifying sand, in which a design is given for removing excesses of both coarse and fine fractions

By EDMUND SHAW

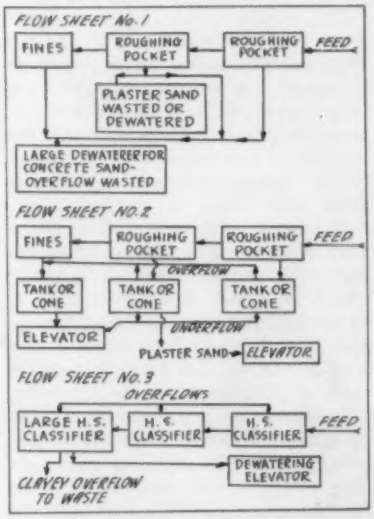
THE WRITER has tried to design a simple and inexpensive system to improve the grading of such sands as those described in the April installment, which could be used for sands having too much in both the coarse and fine fractions. For occasionally a sand with too much in the 4- to 14-mesh fraction has been noted.

At the great plants that have been built to prepare aggregates for the large dams which have been constructed in the past few years, there are large tonnage classifiers, working as perfectly as possible with conveyors fed by feeders that can be set with accuracy to portion the fractions so that the grading may be controlled to 1 percent, or even a fraction of 1 percent if that were desirable. [Recently, the same methods have been applied to a plant producing 50 tons per hour.—THE EDITOR.] The design the writer will describe in what follows is, of course, less expensive as well as less accurate in operation, but the description will serve to illustrate certain principles and how they are applied.

There are two classifiers of the kind known as "roughing pockets," placed in the launder that brings the sand and water from the screens. Those in the drawings are designed to take 50 to 60 tons per hour of sand, with a 6 to 1 dilution. They have baffles, sheet iron plates, that may be raised up and down, and by changing grooves, set nearer and farther from the entrance of the feed. This is one way of controlling size distribution in the classification. Probably the first pocket, for catching only coarse sand, would do better without the baffle.

The other way of controlling the classification is by varying the size of the slot through which the pocket is discharged. It is planned that each of the two classifiers should take about one-third of the feed, the remaining third going to the last dewaterer without classification; so the slots are figured to discharge one-third of the feed.

The formula for the discharge of pulp through an orifice is the same as the discharge of clear water, except that the area of the opening must be about 20 percent greater for ordinary pulps on account of the friction of the solids on the sides of the slot. The velocity as with water is $\sqrt{2gh}$. The formula for clear water



Flow sheets of various capacities of roughing pockets and dewaterers

is $Q = CA\sqrt{2gh}$, Q being the quantity of water, A the area of the discharge and C a coefficient.

Transposing, we have $A = \frac{Q}{C\sqrt{2gh}}$ as the area of the orifice, or slot in this case.

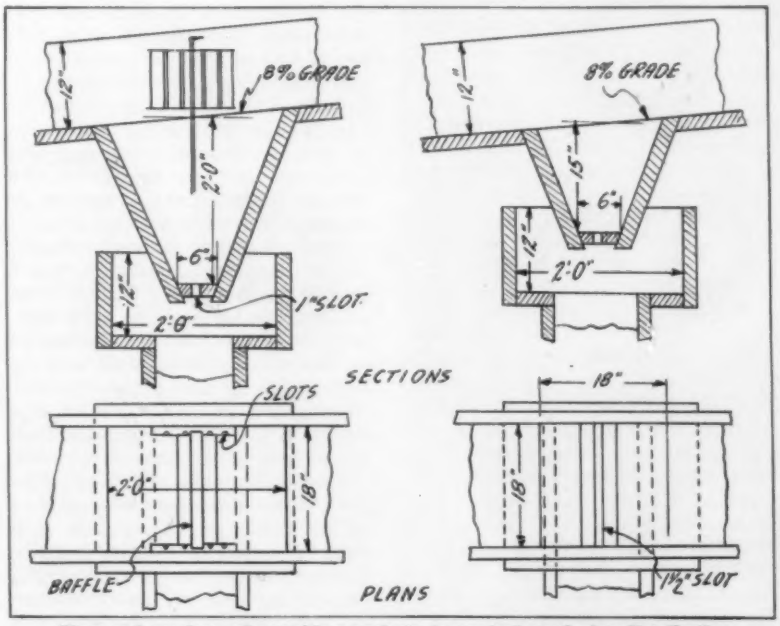
The quantity Q is obtained from the specified 60 tons of sand and 360 tons of water per hour. As there are 32 cu. ft. of water in a ton, the volume of a ton of this pulp would be $\frac{32}{1.094}$, its specific gravity, or 29.2 cu. ft. Then

$$\frac{(60 + 360) \times 29.2}{3600} = 3.41$$

which is the cubic feet per second in the feed. As each pocket takes a third, its feed would be $\frac{3.41}{3}$, or 1.14 cu. ft. per second.

Modifying the formula for pulp we have,

$$A = \frac{1.14 \times 1.2}{0.8\sqrt{64 \times 1.5}} = 0.174$$



Plan and sections of roughing pockets to control sand size distribution

The height (h) is taken at 1.5 ft. for the first roughing pocket, and it would be 2 ft. for the second. The factor 1.094 is the specific gravity of the pulp. The coefficient C has a value of 0.8 for the slot, and the factor, 1.2 is for friction, as has been explained.

The area found is 0.174 sq. ft., which is 25.05 sq. in. As the pocket is 18 in. wide, a slot about 1⅜ in. wide would be sufficient. It would be better to make it 1⅝ in. wide, and then to drive wedges into the end to shorten it to the size that would give the quality and quantity of product desired.

The drawing below shows the products of the pockets going to two dewaterers of simple design, such as all machinery houses make for sand and gravel plants, and a screw dewaterer for the fines. This was chosen because it makes less agitation, which might send needed fines to the overflow.

A simple method of taking out a part of the sand from the middle dewaterer is shown; a hole in the drain board is tapped so that it may be fitted with pipe nipples of the required size. Where much of the medium sand had to be wasted, two or perhaps three such holes might be necessary.

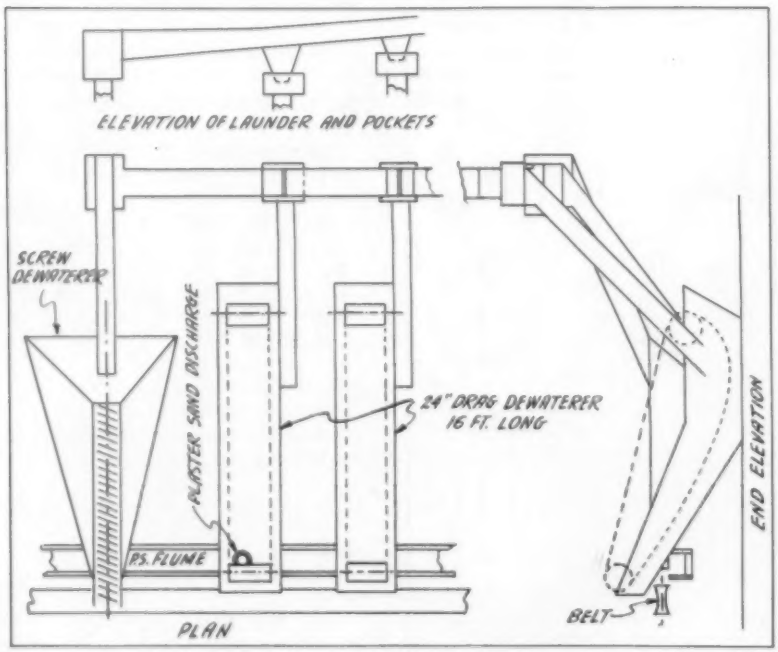
It is plain that this combination of roughing pockets and dewaterers may be varied in a number of ways, and simple flow sheets have been drawn to show some variations. Flow Sheet No. 1 is the simplest. The product of the second pocket is split and a part sent to waste or to any kind of dewaterer for plaster sand. The remainder of the pulp goes to one large dewaterer, the product being concrete sand and the overflow wasted. The difficulty with this is that the dewaterer would have to be unusually large if it were not to waste any of the fines.

No. 2 Flow Sheet shows automatic cones or sand tanks used as dewaterers. It is assumed that the fines must be carefully saved, so the entire overflow goes to a large tank of the same kind. The products of these tanks go to a flume with a small quantity of clear water and to an elevator which lifts them high enough to make a stockpile in which the sand drains. This plaster sand from the middle tank goes to a small elevator for draining and storage.

Flow Sheet No. 3 gives a more elaborate method of control. Instead of roughing pockets, hindered settling classifiers of the launder type make the classifications. If these have no automatic control of the discharge their product will be too wet to carry on a belt, so everything will run into a dewatering elevator. This should give a sand which is unusually free from clay, and it might be used where the deposit contains much colloidal clay.

These are not all the possible combinations, and one who thinks of installing such a method would do well to study its possibilities and choose that which would be best adapted to his conditions.

[*To be continued*]



End elevation of dewaterer installation with roughing pockets in the launders

Grading Fine Sand Products

(Continued from page 34)

for rising currents, with water delivered from a 2-in. Morris pump direct-driven by a 7½-hp., 3600 r.p.m. motor through 500 ft. of 4-in. pipe. It will be seen that a wide range of gradation, all minus 14-mesh, can be obtained by these devices and that different products can be obtained from each tank at the same time. The products of the tanks are flumed to stockpiles or to cars for shipment.

Sand and water rejected by the Telsmith tanks is delivered by flume to two 10-ft. Allen tanks. Any desired amount of minus 48-mesh sand and water from the primary settling box can be added, resulting in a feed that can be varied widely. By changing the float level in these tanks any desired amount of minus 100-mesh particles and all dirty water is rejected into a flume that empties into the dredge pond to be used again. Product of these tanks is discharged into a 3- x 5- x 6-ft. wooden box, mixed with the desired amount of fresh water, and pumped by a 2-in. Wilfley slurry pump, direct driven by a Louis Allis variable speed, variable horsepower motor, to either one of several desired places. By use of valves the product or any part of it can be pumped to stock, to cars, or it may be mixed with any other plant product.

Three stockpiles of material meeting standard concrete, traction and asphalt sand specifications are maintained, and by blending desired amounts of each with a crane nearly all unusual specifications can be met from stock. Stripping and the loading of cars and trucks from stock is done with a ½-cu. yd. Speeder crane or with a ⅝-cu. yd. Lorain shovel.

A 16- x 30-ft. building is used for an office, a shop and stock room and is equipped with a set of Winslow 24 ton truck scales. A full set of standard test screens and a Tyler mechanical shaker are used and each car is tested for gradation before leaving the plant. Very frequent tests are taken of the plant product. Electric power is purchased and delivered to the plant at 2300 volts over ½ mile of special line to three 75 kv. a. transformers and to the plant and dredge at 220 volts through standard distribution and fused safety switches. The plant was designed by D. C. Hicky, chief engineer, and built by Mr. Hicky and the author. It is under the supervision of A. G. Seitz, vice-president in charge of operation; Mr. Bovee, general superintendent, and D. C. Hicky, Jr., superintendent.

Coal Requirements for Lime

Volatility of coals, ash content, richness of gas produced and size of coal are factors which influence kiln efficiency and quality of lime

By VICTOR J. AZBE

PURCHASING COAL for a lime plant does not involve the same things as buying coal for a boiler plant. Many special factors must be considered. For example the purchaser must know whether the coal is long flaming or short flaming, the nature of its ash and its fusing point, what is the character of its sulphur and how much of it will escape up the kiln. In many cases even the presence of arsenic must be considered.

Much depends upon the nature of the kiln which is to be fired and there are many varieties of kilns. If it is a vertical kiln, it may be producer gas fired or direct fired. In both types low sulphur content is desirable because sulphur passing through the kiln can convert some of the lime to calcium sulphate. The presence of calcium sulphate in even very small quantities is undesirable, particularly when the lime is intended for use in steel plants.

In the case of gas producers of the automatic type operating at low capacity, ash is not so very objectionable if one does not have to pay for the ash, because gas producers when operating at low capacity are then ashed more frequently and a looser bed is maintained. When producers operate at high capacity, this desirability does not exist. High volatile coal is best for gas producers since it tends to give cooler gas and also makes higher producer capacities possible. Price, however, is an important consideration and due to intense competition lime manufacturers cannot well afford to pay any considerable premium for coal of specially desirable characteristics.

Coal Ash Causes Difficulty

For any application, and particularly with gas producers, high fusing ash coal is desirable since less of an endothermic agent will be needed such as steam, or CO_2, which now are finding general application. Then the gas will be richer in quality and, strangely to say, cooler in temperature and will contain less soot which is a problem in all gas producer plants. Very rich gas, however, when mixed with highly preheated air coming up the lime cooler, may cause excessive temperature in the hot zone if provisions do not exist for tempering, and will thereby cause injury to both the lining and the product.

Coal ash, even when it is high in fusing point, should not find its way into lime kilns since with the addition of the lime it would readily become fusible. Even very little of it may prove damaging to kiln walls. Low fusing coal combined with low ash content may at times be troublesome because the slag may run and clog the grates. Low ash coal in itself may burn out the grates. Grates should be protected by a loose bed of ash that does not melt into large clinkers.

Too high fusing point ash may, however, be troublesome. It may be so fine that it is difficult for the air to penetrate, requiring a much higher blast in the producers. Ash in producers really should melt into pebble size clinkers. If such coal would be available for direct fired grates, then shaker grates would be an advantage and fire cleaning at a minimum.

Size of coal is another item to consider. In some cases an operator wants large lumps that will heat and distill the volatile matter slowly. In another plant small uniform egg size coal may be found preferable provided there is but a small amount of fines, so that there is a minimum of segregation in coal bins. But often washed screenings are bought because the cost of fuel per ton of lime then may be the lowest.

Caking coals compared to free burning are always troublesome except when coal is to be pulverized. On direct fired grates the crust that forms prevents the passage of air and in producers as well, where even the continuous action of the agitating bar may not be able to break the lumps. This sort of coal may also puff up, like raising dough, and for the same reason, the gases being generated inside of the mass that is surrounded by a tarry crust that prevents their escape. If temperature is low, which favors this condition, the fuel volume may increase to several times its normal.

Considering these factors it will be seen that the problem of buying coal is not exactly simple. A lot of factors must be considered besides the very important item of number of B.t.u.'s available for each cent expended.

LIME FORUM

Mr. Azbe is a contributing and consulting editor of ROCK PRODUCTS. He will be glad to receive inquiries from his readers, and will answer these direct or through the columns of this Forum.

More on Manitou Kiln Efficiencies

NESTING at the foot of Pike's Peak in Colorado, is the Manitou plant of The Thomas and Brown Lime Co. In the March, 1940, issue of ROCK PRODUCTS, p. 53, we referred to it as a sort of an imperfect copy of the old Glen Park plant, but principally through the efforts of J. A. Brown, president, this plant has been improved to such an extent that it well deserves more space and can even serve as a good example to the many struggling lime plants of today.

The writer inspected this plant thoroughly about 15 years ago but since then he has been completely out of contact with it. In the meantime it was sold and Mr. Brown started improving it. The improvements were made without any outside technical help, so the credit is solely his, although he is kind enough to mention the helpfulness of articles appearing in ROCK PRODUCTS.

The plant is located at an altitude of about 7000 feet, which affects performance adversely. The air is considerably thinner, which tends particularly to reduce capacity. Originally the area of the shafts in the hot zone was 30 sq. ft. and the height of the kilns above the bottom

of the draw hoppers was 45 feet. Kilns were fired with gas from semi-gas producers.

The average kiln capacity obtained in the old days was six tons of lime per kiln per day with considerable variation. Fuel ratio had the same variation, from as low as 2.2:1 to as high as 3.6:1, averaging 2.8:1 over a period of six months. In contrast with this, the capacity of lime produced per kiln day is now 15.4 tons and the fuel ratio is 4.57:1. The lime is soft burned, white and reasonably free of core and stain. Limestone used is of a hard texture, very pure high calcium type, with an average nearing 99 percent $CaCO_3$. An interesting feature is that they can draw at the rate of say 10 or 12 tons, then when necessary speed up to 18 tons for longer periods and even up to 25 tons for shorter periods without drawing inferior lime.

This performance was made possible by (1) some changes to producers and the kiln interior; (2) by getting the drafts, below and above, under full control; (3) by recirculation of some of the waste gases; (4) by thorough training of, and cooperation with, all of the men having anything to do with firing, filling and drawing.

Mr. Brown writes us that to accomplish all this, "It was not easy, quite on the contrary. It took several years of hard, steady, painstaking efforts, during which we had many discouragements, lots of grief and considerable expense, before reaching the present state of kiln performance."

While the performance of this plant does not equal in either capacity or efficiency the new individual producer kiln described in March, 1940, for all we know it may in quality of lime. We would just naturally expect better results from something new than from a plant around 20 years old. However, we can say this, that performance of these Manitou kilns is far better than that of the semi-gas producer fired kilns found in any of the lime plants in St. Genevieve today. For a simple plant, the results are exceptional and Mr. Brown and his men are to be congratulated.

Abstracts from Foreign Papers

By DR. F. O. ANDEREGG

THE EFFECT OF SULPHATES on the shrinkage of Portland Cement: Variation in the tricalcium aluminate in different portland cements requires careful study of each cement to determine just the right amount of gypsum to add to reduce the shrinkage after setting. Then care should be taken to add to the clinker this amount with great accuracy. Both too much and too little gypsum increase shrinkage, according to G. Haegermann. (From Zement (1939) 28, No. 40, p. 599; No. 41, p. 609.)

Comparative Experiments with Lime Mortars: Lime mortar is extensively used in Germany, and the results obtained by Dietrich indicate the advisability of using rather lean mixes. For instance, according to the brand of lime used, mixes with ground hydrates ranging from 1:4 to 1:6 are recommended for stucco finish, while for brick laying, mixes may vary from 1:6 to as high as 1:18. But it must be remembered that most of Germany has a comparatively mild climate, and that most of their brick work is protected by stucco. (From Tonindustrie Zeitung (1940) 64, No. 2, p. 11; No. 4, p. 24.)

Constitution of Portland Cement Clinker: K. Koyangi and T. Sudoh have reached the following conclusions: Two different preparations of tricalcium silicate yielded identical X-ray spectra, but they both differed from that of portland cement alite. By including a trace of MgO and tricalcium aluminate, however, the spectrum of the tri-silicate could be made identical with that of alite. About 1.0 to 1.5 percent MgO is taken up to form a "mixed crystal." From Zement (1939) 28, No. 37, p. 563.)

Ancient Lime Mortars: A study has been made by F. Müller-Skjoid of some of the old stuccos put on by the Romans nearly 2000 years ago. He finds great differences in the compositions. Sometimes lime was mixed with crushed brick, with ground volcanic rock and sand; again it was mixed with 1 to 2 parts of crushed marble for a finish coat. The Romans soaked all lime usually 2 to 3 years. Mosaics were often embedded in a rather rich lime mortar. (From Tonindustrie Zeitung (1939) 63, No. 73, p. 824.)

The Initial Set of Concrete: The large aggregate in concrete makes it difficult to observe when the initial set occurs, so R. Grün proposes to mix sufficient stone dust with cement to arrive at the same water-cement ratio as in concrete. In this way a needle may be used to give a pretty good estimate of the setting time in the concrete. (From Zement (1939) 28, No. 39, p. 591.)

A granular filter material made from calcined dolomite now is being used in Germany for the removal of acidity from water supplies. The active components of this material are calcium carbonate, magnesium carbonate, and magnesium oxide. The process is of particular value in that it removes dissolved iron and manganese from the raw water and retains them in the filter. The hardness of the water is increased by about 0.85 deg. (German) for every 10 milligrams of CO_2 removed per liter. In waters of high content of CO_2 and low carbonate hardness the pH value is raised to about 8.5; the pH value of hard waters remains unchanged. Filtration through these filters reduces the aggressive action of the water to the same extent as lime treatment. (From Chemikerztg. 62:517 (1938).)

Profit in Stone Screenings

(Continued from page 30)

siding and consists of a 175-ton, 2-compartment bin, belt conveyor, a pug mixer and a loading out tipple for direct loading into cars or from a bin into trucks.

Each of the two sands is put into the separate, adjoining bins by a stiff-leg derrick with a clamshell for stockpile handling to the main plant. Special star-roll feeders pay out the two sands in desired amounts to an 18-in. Link-Belt belt conveyor, 120-ft. centers, which at its head end discharges into a pug mixer at the tipple. The revolving feeder has blades which are chain-driven by a gear-motor. Sliding, lever-operated gates on the bin chutes and the sprockets on the drive may be varied to change the rate of feed of either sand to the belt in changing the mix. The pug mixer which inter-blends the discharge from the belt empties either direct into a chute for car loading or into a bin below for truck loads.

Blending rate of the plant is 150 tons per hour, loading a standard car in about 20 minutes. The normal blend is 60 percent natural sand and 40 percent granite sand which produces a sand grading as follows:

Percent passing	Sieve
100	No. 4
99	No. 8
20	No. 50
4	No. 100

This gradation just about splits the requirements for state highway paving and is satisfactory in service.

NEWS ABOUT PEOPLE

HANFORD MACNIDER, president of the Northwestern States Portland Cement Co., Mason City, Iowa, was indorsed at the Iowa Republican state convention to have his name presented for the presidency by the 22 Iowa delegates to the Republican national convention in Philadelphia. The resolution praised him as a "citizen, farmer, business man, and soldier in whose hands the destiny of our people might be safely entrusted." Mr. MacNider is a former national commander of the American Legion, a former assistant secretary of war, and former U. S. minister to Canada.

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LATHAM GRAY, superintendent of the Forestport, N. Y., plant of General Crushed Stone Co., has resigned to devote his time to a stone plant near Tarpon Springs, Fla., of which he has recently purchased a part interest. D. C. Hicky, Jr., succeeds Mr. Gray at Forestport.

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JOHN PRINCE, president of the Stewart Sand & Material Co., Kansas City, Mo., as president of the Missouri Mineral Industries Conference, presided at the second annual conference held at Rolla, April 26 and 27.

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DR. R. R. SAYERS, senior surgeon of the U. S. Public Health Service, has been detailed as acting director of the Bureau of Mines to succeed John W. Finch. Dr. Sayers was head of the Health and Safety Branch of the Bureau from 1915 through 1932, at which time the branch was part of the Public Health Service. It has not been indicated whether a permanent director will be chosen soon.

•

W. E. VIETS, assistant secretary and treasurer, also credit manager, in the Chicago office of the Alpha Portland Cement Co., retired on April 1. He began in the cement business with the Kelley Island Lime & Cement Co., in 1900 and for more than 20 years has been employed in the Chicago offices of the Alpha company.

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HOWARD E. DULMAGE has been named works manager of the Cleveland Quarries Co. at Amherst, Ohio to succeed Paul A. Mori, who was promoted to vice-president in charge of mechanical operations of all the company's properties.

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FRED L. MAYS, branch manager of the Columbia Concrete Pipe Co., which operates plants at Charlotte and Lileville, N. C., has been named assistant general manager of the company.

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THOMAS D. HENSHAW has been elected secretary of the Riverside Cement Co., Los Angeles, Calif., to succeed William H. Metcalf, who is now on a leave of absence. Dudley Dexter has been appointed assistant secretary and William Donaldson and B. G. Watson have been given assistant treasurerships.

•

HAROLD HILLER, superintendent of the France Stone Co. plant at Bloomville, Ohio, has been transferred to the Donora, Penn., plant. Earl Adams will succeed him at Bloomville.

•

NELS E. JOHANSON, vice-president and general manager of the George Scofield Co., Tacoma, Wash., has been transferred to the parent concern, the Pioneer Sand & Gravel Co., Inc., Seattle, to serve as vice-president and as assistant to Gordon N. Scott, president. A. J. Mitchell, sales manager of the George Scofield Co., will succeed Mr. Johanson as vice-president and general manager.

•

E. R. GUSTAFSON, traffic manager of the Universal Atlas Cement Co. in Chicago, has been elected president of the Traffic Club of Chicago.

•

FRED H. EDWARDS, JR., recently superintendent of the Cheshire, Conn., plant of New Haven Trap Rock Co., resigned last December to take a position with the Firestone Tire and Rubber Co., in Liberia, West Africa. The Firestone company is building a hydro-electric plant and paving a number of miles of road. To supply aggregates, it will operate a quarry and crushing plant. Mr. Edwards is to have charge of the quarry and crushing plant operation and the concrete mixing plant. He is a son of F. H. Edwards, general superintendent of the New Haven Trap Rock Co. at New Haven, Conn.

•

L. G. HENRY has succeeded the late F. J. Jiggens as treasurer of the Giant Portland Cement Co., Philadelphia, Penn.

•

T. G. MOONEY has been appointed to assist C. F. Miller in the management of production, promotion and sale of Pottsco lightweight concrete aggregate. He has been associated with the Pozzorite Corp., also a Celotex subsidiary, for the past year, and before joining the Celotex Corp., managed the technical and service department of the North American Cement Corp.

•

GEORGE KILIAN, secretary and treasurer of Pennsylvania-Dixie Cement Corp., New York City, has been elected a director to succeed Walter S. Wing, who resigned.

(More news appears on page 86)

Father, sons and toastmaster get together at the dinner party held at Northampton Country Club, Easton, Penn., on the occasion of the seventieth birthday of W. E. Farrell, president of Easton Car & Construction Co. From left to right they are J. C. Farrell, Dr. Elliston Farrell, Otho M. Graves, toastmaster, and W. E. Farrell

Hints and Helps

★ FOR SUPERINTENDENTS ★

Protection for Belt Conveyors

MOISTURE and sunlight quickly rot out belt conveyor fabric if the rubber covering which protects the fabric becomes torn or cracked. Belting usually rots out before it wears out. It is also known that frequently tears take place which are not detected or repaired for some length of time. Stockbridge Stone Co., Stockbridge, Ga., when it rebuilt its crushed granite plant, provided protection against the elements as much as possible by building a galvanized roof over a belt, 150-ft. centers, which carries stone from the primary crusher to the secondary crusher. The roof is A-shaped and extends the full length of the conveyor, projecting 10 in. over the belt on each side. The construction is such that sunlight never will reach the belt, and very few rains will either unless at high wind velocities.

Belt conveyor carrying stone from primary crusher to screening plant is covered with A-shaped galvanized iron cover to protect belt from rain and sun

Portable Diesel-Generator Plant for Shovel

FORDYCE GRAVEL Co., Pharr, Texas, uses stationary Diesel power to operate the plant and for operation of a 1¼-cu. yd. electric shovel. The illustration shows how a Caterpillar D7700 Diesel engine is belted to a 75 kv.a. electric generator, with the unit mounted on a wagon for mobility around the excavation. Rubber-covered electrical cable, is used to connect with the shovel. The shovel produces 120 cu. yd. per hour, operates a 10-hour day and consumes 3 gal. of fuel per hour.

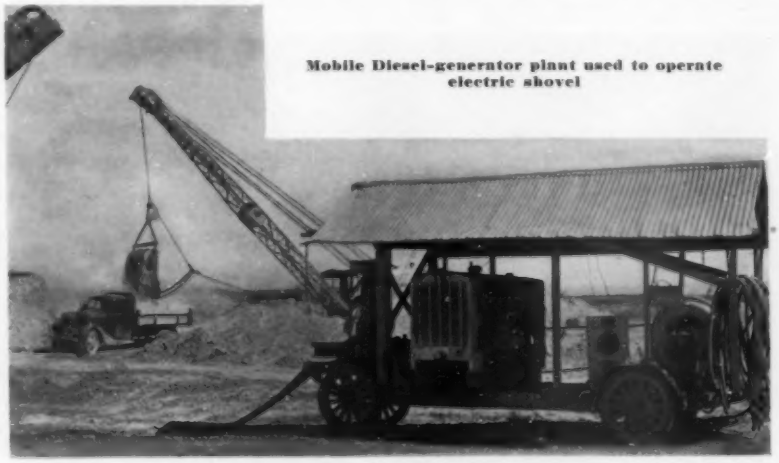
Removing Fines From Molding Sand

MUCH OF THE MOLDING SAND used in foundries today is reused after reconditioning. Sometimes equipment used for reconditioning may have applications which would prove helpful to the producer. Such a piece of equipment is one that reconditions used sand by sucking out the fines in a dry treating process. It is quite possible this device has quite a wide application in the rock products industry for dry cleaning various products. A recent article appearing in *Iron Age* describes the methods and equipment used in the molding sand reconditioning plant of Farrel-Birmingham Co., Inc.

This new sand unit is said to be the first sand reclaiming system capable of handling both cement bonded and clay bonded sand. Used sand enters the system through the shakeout, having a screen which passes all material up to 3-in. lumps; all larger lumps must be broken down to a 3-in. size.

From the shakeout, the sand moves on an underground conveyor and over a magnetic pulley which removes tramp iron, discharging to the boot of a vertical elevator which carries it to the top of the reconditioning plant. From this point, the sand runs into a revolving screen where three separations are made; 1 to 3-in. lumps, 20-mesh to 1-in., and sand minus 20-mesh. The 3-in. and 1-in. lumps are chuted into bins, while the finer material "bumps" over the sand cascade, shown in the illustration, and is carried by conveyor to a vibrating screen, the throughs passing into the reclaimed sand bin. When handling clay bonded sand, the vibrating screen is by-passed and the sand is moved into the reclaimed clay bonded sand bin by means of a short shuttle conveyor.

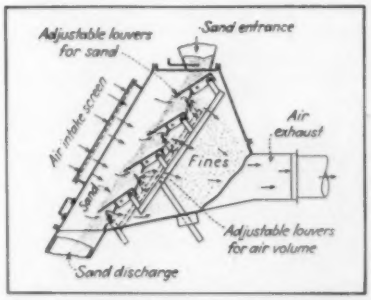
At the bottom of the lump hoppers is a series of gates and a vibrating feeder which permits either drawing the lumps off for backing or venting purposes, or passing them through the pulverizer which reduces them to approximately 20-mesh size. The operator has the option of drawing off either 3-in. or 1-in. lumps. From the pulverizer, the sand is carried back into the vertical elevator and up again to the revolving screen. New silica sand is unloaded at the receiving bin and is conveyed by belts to the four storage bins.



Mobile Diesel-generator plant used to operate electric shovel

The entire handling system was installed by Link-Belt Co. Other equipment includes: a Simplicity shakeout, a Stedman pulverizer, Magnetic Manufacturing Co. magnetic pulley, Fairbanks scale, and American Air Filter Roto-Clones for dust collection.

At this foundry a No. 30 New Jersey silica sand, with about 75 percent of the grains concentrated on



Cascade used to recondition foundry sand removes fines

the 40, 50 and 70-mesh sieves, is used. The sand is a No. 6 sand, according to A.F.A. classification. When this sand is ordered, it is specified that no more than 0.2 percent pass 200 mesh and as little as possible below the 150 sieve.

While the amount of new sand used varies with the trend in the demand for the various mixes, the average monthly ratio is approximately 1 part new sand to 3 parts old sand.

Handling Cement in Paper Bags

Alfred Destin Co., Miami, Fla., ready-mixed concrete producer, has a 50-ton, 2-compartment Butler batching plant and a delivery fleet of four 2-cu. yd. Jaeger truck mixers on International trucks. Crushed coral rock and sand are the aggregates and cement is received in paper bags.

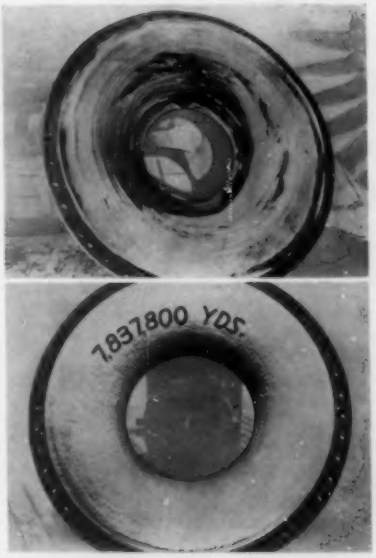
Cement is dropped into the truck mixers through a cement chute from the batching floor, and the bags are emptied into the chute as illustrated. Over the chute may be seen a removable wood framework, or collar, which has steel teeth spaced about 14 in. apart. As needed, the bags are slit crosswise on one side by a stroke of a sharp knife. The bag is then dropped on the metal points and pushed down at the middle, emptying completely and quickly.

The company was organized by Alfred Destin, Andrew Destin, Maude E. Destin and Rosalie Destin, partners, who also operate the Miami Block Co., manufacturing concrete products. J. E. Ray is general manager of ready-mixed concrete activities.

Reducing Wear In Pump Liners

Fort Peck Dam, situated on the upper Missouri River in Montana is a huge earth-fill structure which was built by hydraulic methods. Particles handled by the 28-in. pumps were unusually sharp and abrasive for alluvial material, and excessive wear developed in the original cast steel and rolled steel plate liners.

After a number of experiments, a 25 percent chromium, 2 to 2.5 percent carbon cast alloy was adopted for front and back head liners. This high-chrome iron has a Brinell hardness of about 600 and a tensile strength of over 60,000 p.s.i., combining the hardness to resist abrasive action of sand-and-water mixtures with sufficient shock resistance to withstand impacts received while pumping gravel and glacial boulders.



Above: Medium-carbon cast steel suction head liner for dredge pump badly worn after pumping 1,470,500 cu. yd. of material. Below: Similarly designed high-chromium casting in condition for further use after 7,837,800 cu. yd. of service under the same conditions

In the illustrations are shown one of the old liners which had to be repaired after pumping 1,470,500 cu. yd. of material and a similarly designed 25 percent chromium casting which was still in condition for further use after 7,837,800 cu. yd. of service in a dredge pump. The Electro Metallurgical Co. designed the alloy composition for these high-chromium iron liners.

Left: Showing how cement in paper sacks is discharged into cement box and then into mixer. Note sharp, steel teeth to hold sack over cement receiver. Sack has been cut crosswise with knife. Center, inset: Ready mixed plant and modern truck mixer equipment. Right: Cement bag being emptied, cut side down

NATIONAL ASSOCIATION ACTIVITIES

Lime

NATIONAL LIME ASSOCIATION has a full program scheduled for its 22nd annual convention to be held at the Drake hotel, Chicago, May 21-23. The tentative program schedules business meetings for the first day; a discussion of the Robinson-Patman Act by W. F. Dinnen, Federal Trade Commission, Chicago; a paper on the stabilization of clay roadbeds with lime by Sherman D. Lesesne, Oklahoma University; and a discussion of chemical lime by Prof. J. R. Withrow, Ohio State University.

S. B. Kanowitz, Combustion Engineering Co., and Victor Azbe, consulting engineer, will speak on plant operations and particularly on the use of pulverized coal and plant design. Prof. G. L. Clark, University of Illinois, will talk about X-ray studies of lime.

Other papers on labor relations, electrical hazards and promotion will be read by appropriate speakers and Prof. Walter C. Voss and Howard R. Staley of the Massachusetts Institute of Technology will report on the Association's research program on mortars, masonry and concrete.

Ready Mixed Concrete

NATIONAL READY MIXED CONCRETE ASSOCIATION is holding its semi-annual board of directors meeting at the Palmer House, Chicago, on May 16. Executive Secretary Ahearn, in a letter to member companies, discusses the recent case in Washington, D. C., where the U. S. District Court refused to dismiss an indictment against the teamsters union in Washington. The union had been charged with violation of the criminal provisions of the Sherman Anti-trust Act. As a result of this union's action, operators of concrete mixer trucks, belonging to the engineers union, had been induced to join the teamsters union and the controversy had tied up millions of dollars in construction projects. Mr. Ahearn also enclosed a listing of union wage rates in selected building trade occupations in 72 cities as of June, 1939.

In another executive letter, the executive secretary encloses a transcript of the entire proceedings of the open forum on the proposed sales manual held at the recent St. Louis convention. Garvin Pelsue, R. C. Collins and H. F. Thomson, members of the committee, will continue their good work on the manual. Progress reports will be submitted later to member companies.

Stanton Walker, director of engineering, reveals that the letter ballot on the proposed tentative standards for operation of truck mixers and agitators has returned a vote in favor of adoption. The new standard has been made general enough to include the open-top revolving blade type of mixer and the revolving inclined conical drum type as well as the revolving drum mixer. Attached to the letter was the review of the 1939 activities of the engineering division.

Crushed Stone

NATIONAL CRUSHED STONE ASSOCIATION is advocating that its members go on record with their congressmen and senators as to their attitude toward the Walter-Logan Bill, which is looked upon as a piece of legislation very favorable to industry.

The Bill, briefly, provides for prompt issuance of rules by agencies created by federal statute, for notice of public hearing, for appeal without delay incident to presentation of a case in point and for judicial review of decisions of all boards, commissions, administrators and federal agencies, both as to findings of fact as well as law.

[The Walter-Logan Bill has since been passed by the House and is awaiting action if any by the Senate. —Editor.]

COMING CONVENTIONS

National Ready Mixed Concrete Association, directors' meeting, Palmer House, Chicago, May 16.

National Lime Association, Drake Hotel, Chicago, May 21, 22 and 23.

National Industrial Sand Association, The Greenbrier, White Sulphur Springs, W. Va., June 13 and 14.

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J., June 24-28.

National Cinder Concrete Products Association, Atlantic City, N. J., August 5, 6 and 7.

Sand and Gravel

STANTON WALKER, director of engineering, National Sand and Gravel Association, has asked member companies to suggest subjects of outstanding interest to be handled in the open forum on operating problems for the next annual convention.

In order to develop information as to the limitations, in actual plant practice, of the Simplified Practice Recommendations, Mr. Walker has asked the help of members. It is suggested that complete sieve analyses be made of at least two products from each plant, one of which was retained on a selected plant screen and the other of which passed the same screen. It is suggested that the plant screen nearest about 1-in. square be selected and that the analyses be carefully made and sent to Washington headquarters.

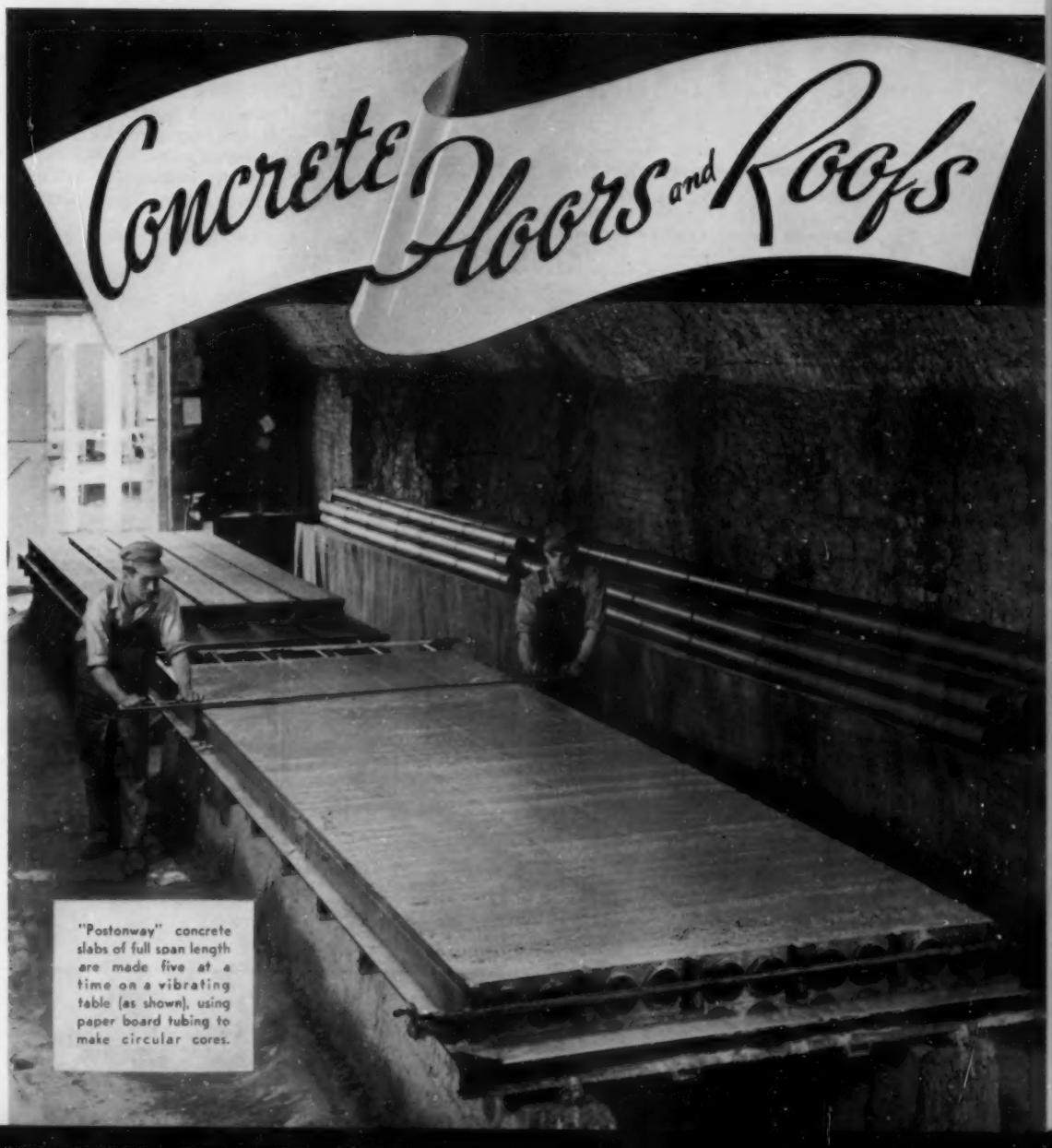
EXECUTIVE SECRETARY V. P. Ahearn, in one of his letters to member companies, cautions that operators of plants in the area granted exemption by the Federal Wage and Hour Law know the limits of the exemption, which he summarizes in his letter.

U. S. Department of Labor, Public Contracts Division, will hold a public hearing in Washington, May 24, 1940, to consider the question of minimum wage determination for the industry under the Walsh-Healey Public Contracts Act.

Another letter is concerned with a meeting held in Washington on the exemption of seamen under the Federal Wage and Hour Law. It was apparent at this meeting that the Division has the definite opinion that employes on dredges engaged in the production of sand and gravel are covered by the Federal Wage and Hour Law if interstate commerce is involved, irrespective of the question as to whether such employes are housed aboard the dredge. It is also clear that employes on tugs and tow boats are considered to be exempted as seamen. Thus far the Division has neither accepted nor rejected the Association's stand that barge captains in the industry are also exempted.

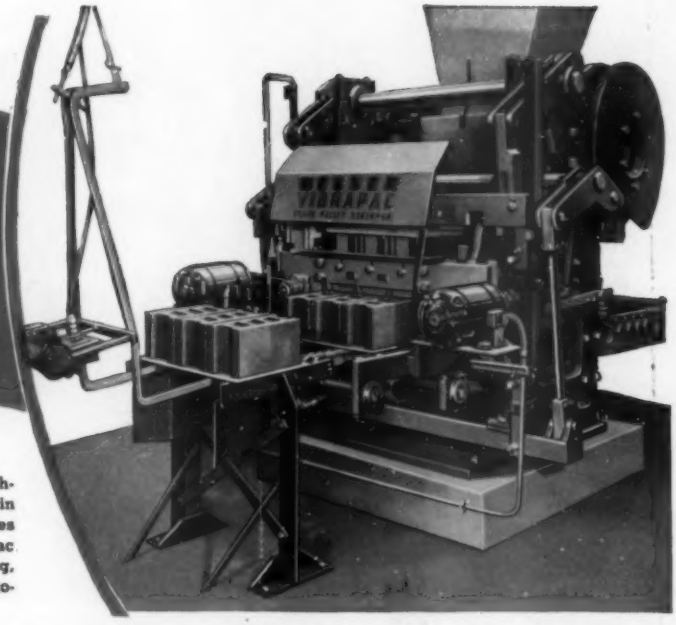
A copy of a bill introduced by Congressman Snyder of Pennsylvania was attached, which would impose an added burden on companies using locks on rivers, by assessment of a toll charge of 1c per long ton of freight for each lock through which it is transported.

CONCRETE PRODUCTS AND CEMENT PRODUCTS



"Postonway" concrete slabs of full span length are made five at a time on a vibrating table (as shown), using paper board tubing to make circular cores.

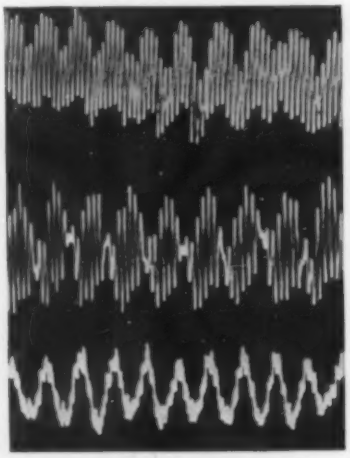
One VIBRAPAC Sells ANOTHER in Adjoining Territory



Early this year Edmonds Art Stone Company at Washington, D. C., installed a Besser Super Vibrapac Plain Pallet Stripper in addition to 3 Besser Super Tamper machines they have been operating for several years. This Vibrapac sold another of the same model to Ernest Maier, Bladensburg, Maryland. Maier also operates his four year old Besser Automatic Plain Pallet Tamper.

VIBRAPAC VIBRATION

Below is photographic record of impulses of undirectional vibration as measured by accelerometer for period of one second, magnified nine times. Undirectional vibration, or free vibration in all directions, is much greater in total frequency, and magnitude and essentially different and more effective than unidirectional vibration, or vibration confined to one direction.



The successful manufacture and sale of concrete blocks on a commercial basis for more than ten years under Flam patents has proven the efficiency of this original undirectional vibration method of block making. In production greater density and strength are obtained by undirectional vibration.

BESSER SUPER VIBRAPAC PLAIN PALLET STRIPPER

100% Automatic. Extremely simple. The Vibrapac combines fully patented undirectional vibration principles with the exclusive Besser Plain Pallet principles. Automatic pallet feeding and one man electric offbearing device. Production capacity 600—8 x 8 x 16 blocks per hour. 8 x 8 x 16 blocks made 3 at a time on one Plain Pallet. Other sizes made in multiples on same set of pallets.

TAMPERS BESSER PLAIN PALLET STRIPPERS VIBRATORS

BESSER TAMPER STRIPPERS

Besser Super-Automatic Plain Pallet Stripper—Daily Capacity 3000 to 4000.

Besser Victory Automatic Plain Pallet Stripper—Daily Capacity 2000 to 2500.

Besser Semi-Automatic Plain Pallet Stripper—Daily Capacity 1200 to 1500.

Besser Champion Power Operated Plain Pallet Stripper—Daily Capacity 1000 to 1200.

Besser Multi-Mold Hand Operated Plain Pallet Stripper—Daily Capacity 250 to 350.

BESSER VIBRAPAC PLAIN PALLET STRIPPERS

Besser Automatic Vibrapac Plain Pallet Stripper—Daily Capacity 4500.

Besser Automatic Victory Vibrapac Plain Pallet Stripper—Daily Capacity 2000.

Besser Master Vibrapac Hand Operated Plain Pallet Stripper—Daily Capacity 800.

BESSER MANUFACTURING CO.

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL, HOBBS, UNIVERSAL, PORTLAND

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THE SAVING IN PALLET COST WILL PAY FOR A BESSER VIBRAPAC PLAIN PALLET STRIPPER

Full Span Concrete Slabs for Floors and Roofs

Joist system is made from vibrated concrete using paper tubing to make circular cores. Stirrups aid in holding tension and compression reinforcing rods

By RALPH S. TORGERSON

EXPLORATION into the possibilities of making and marketing concrete joists, by the Poston-Springfield Brick Co., Springfield, Ill., has developed a new method of producing reinforced precast concrete floor units that is finding widespread acceptance. The "Postonway" unit, as it is called, is in reality a low-cost, cored, concrete slab, so shaped that when placed it forms a contiguous series of steel reinforced precast concrete "I" beams. The shapes were produced in other countries many years ago, but Postonway is produced by a wholly new method.

For more than 50 years, the Poston-Springfield Brick Co., manufactured clay brick exclusively, and then established a concrete products division in order to take advantage of a constantly growing market.

Sand and gravel concrete block of standard 8- x 8- x 16-in. size, for foundation construction, was the first product manufactured. Later, Waylite partition units and a "weatherboard" block, having a slope on the outside face to simulate the effect of a wooden overlapping board wall, were added. A variety of special shapes also are made.

To secure a larger share of the building material market, and in keeping with the trend toward fire-safe construction, Emmett Poston, president of the company, and his associates decided to investigate the possibilities of the standard concrete joist. Another objective was to obtain a floor unit design which would compete with wood and which would also permit its use as a support for the Waylite partition units being manufactured.

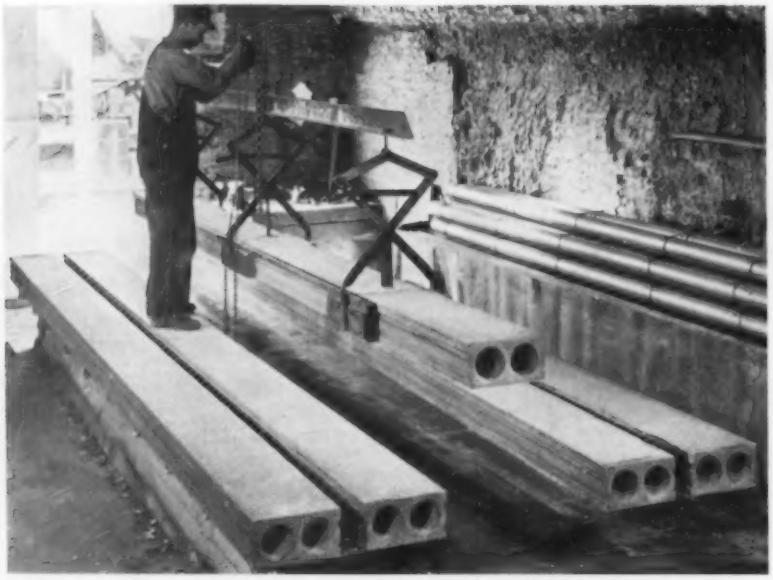
After a thorough study of standard joist systems, a novel method of producing slab and joist concrete units was developed, for which patents have been applied and are now pending.

Manufacturers over a broad area have been licensed to make the units. A typical cross-section of this floor and roof unit is shown in the accompanying drawing. The unit itself has some notable features, but the method of manufacture is of particular interest since it lends itself to mass production at relatively low cost.

Manufacturing Methods

Units are cored and are cast, five at a time, on a forming and vibrating table. The coring is simply a specification paper board tubing, having

Placing reinforcing rods and stirrups in the molds on the forming table, with the tubing already in place. Completed units are shown in the background



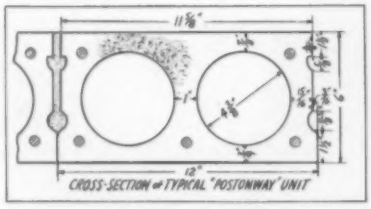
Special tong clamps and chain hoist used for safe handling of joists from the manufacturing plant to the curing room

predetermined moisture absorption qualities. The tubing is held in position in the steel forms by heavy steel wire stirrups set cross-wise in the forms at 14-in. centers over the entire length of the forms. At each end of the forms are steel templates which receive the ends of the tubing. The stirrups also are designed so that the longitudinal reinforcement rods automatically drop into exact position. Two rods serve for compression and three for tension. Another important function of the stirrups is to engage the lower channel forming projections on the steel forms to offset tube buoyance when the concrete is poured and later vibrated into place.

As manufactured in the Poston plant, five units are cast at one time on a vibrating table built of ½-in. steel plate. This plate floats on rubber mountings and is well supported structurally throughout its 6- x 25-ft. area. The Poston organization insists that the production of precision units can come only from rigid and precise equipment. The vibration is accomplished by a push-button, automatic release built-in vibration assembly. Everything about the operation of the process has been simplified.

The total elapsed time from pouring to transfer to the curing room is seven hours. While the concrete on one table of forms is setting, other tables are being prepared. Waylite aggregate and high early strength cement is used in a 4 to 1 ratio, using enough for a soupy consistency.

The plant is designed for straight line production. An electric-driven road type mixer of 28.3 cu. ft. capacity, mounted outside the building, is fed aggregates, cement and water by wheel-barrows operating up an incline to the charging platform. A specially designed bucket suspended from an overhead monorail hoist receives the charge from the mixer and travels into the manufacturing building to a point directly over the forming and vibrating table. The bucket is so designed that the charge of concrete (approximately ½ cu. yd.) is dumped with little effort. The supporting frame for monorail and hoist has been made of Postonway units.



CROSS-SECTION of TYPICAL "POSTONWAY" UNIT

Handling and Curing

A tong-like device is used in picking up the units. It transfers the units, step by step, to the curing room, to the yard or to the truck or railroad car. This device holds the units firmly by conforming plates at the ends of the tongs. These engage the key depressions running the length of the units. A lever locks the tongs firmly to the sides of the joists. Carried in this way, no damage is done to the "green" floor joist units.

All units are water sprayed for three days, and then are yard-cured for at least nine days. Units are stocked in even foot lengths, and special sizes are cut to order. A Stanley electric saw with carborundum blades is used to cut the units. About 1½ minutes are required for cutting a unit to desired length.

It will be noticed in the cross-section that the units have key depressions on the sides and slope outward slightly at the top so that they may be bonded to each other in the floor system by the use of concrete grouted into the keys provided in the design. Double shear tests, made of these grouted joints by the Robert W. Hunt Co., testing engineers, indicate an allowable shear strength of 2688 lb. per lineal foot of double joint. No attempt is usually made to remove the paper tubing used for cores after the slab units are cured, but if desired it may be easily pulled out by hand. W. A. Brewerton, secretary of the company, is the active head of the concrete products division.

Gravel Company to Make Concrete Pipe

L. G. Everist, Inc., Hawarden, Iowa, sand and gravel producer has leased two stalls in the Northwestern railroad roundhouse and is installing equipment for the manufacture of concrete culverts and tile. The layout will be very convenient for receiving aggregates and shipping the finished tile by rail. Sizable contracts already are on hand for products to be used on South Dakota roads.

New Concrete Block Plants

Kenny King and George B. Eichenlaub, formerly managers of an East Columbus, Ohio, concrete block and building supply business, have opened a new concrete products plant and material yard at 600 N. James Rd., Gahanna, Ohio. They will handle sand, gravel, cement, lime, tile, flue liners, septic tanks, etc.

•

James J. Van Vliet and Son, Kingston, N. Y., has been formed as a partnership for the manufacture of concrete products. Partners are James J. Van Vliet and James J. Van Vliet, Jr.

•

Kansas-Missouri Silo Co., Topeka, Kan., is expanding and has recently begun the manufacture of concrete blocks.

•

C. F. Lytle Co., Sioux City, Iowa, has gone into the concrete products business and is operating a new plant with Stearns Joltcrete machine using Waylite aggregate.

Increasing Concrete Yardage By Reducing the Haul

Semi-portable batching plants and dry batch transfer conveyor used to reduce mixer truck mileage

By **BROR NORDBERG**

Semi-portable plant now used on government project

IN DENVER, COLO., where ready-mixed concrete was first introduced in 1936 by the Ready Mixed Concrete Co., practically all transit-mixed concrete sold is used in the larger construction projects; city, county, federal and private. Conducting this type of a business with efficiency is quite different than the methods employed in the ordinary large metropolitan districts where a few cubic yards of concrete sold to numerous relatively small customers add up to considerable volume.

It's not a case of promoting the sale of ready-mixed concrete to many customers who know little or nothing about concrete, but one of meeting definite specifications satisfactorily and having facilities to properly service a job on schedule.

The company was started as a partnership by Frank P. Spratlen, Jr., president-treasurer, and Lloyd S. Brannan, vice-president and secretary of Spratlen-Brannan, Inc., Denver's largest producer of sand and gravel, with a single batching plant that was soon moved into a location more favorably located with respect to the center of industrial activity.

Three Types of Plants

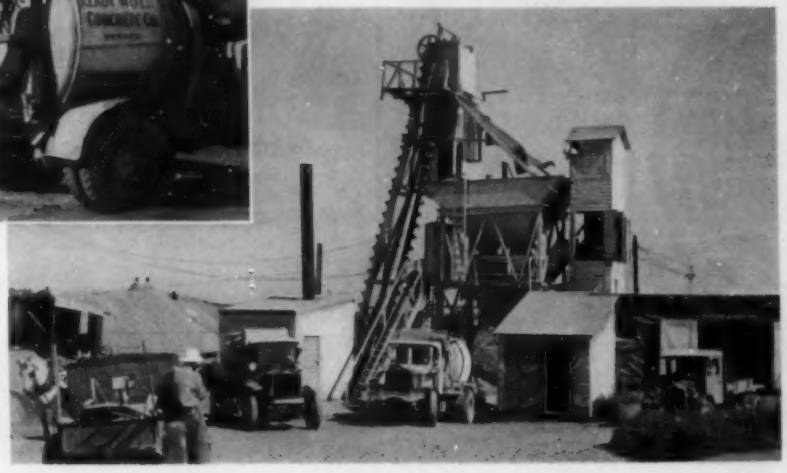
Since plant No. 1 was built and then enlarged, a second and a third unit have been added. All are Blaw-Knox built. The No. 1 plant is permanently located on a railroad siding to receive bulk cement, the No. 2 plant is semi-portable so that it can be transferred to various large construction sites, and the No. 3 plant, completed in 1939, is located at Lowry field where the U. S. government is using a large quantity of concrete in the construction of the army air school.

In addition to semi-portable steel plants located at job sites or within economical hauling range, the company has a 24-in. Barber-Greene transfer conveyor, 39-ft. centers, that is very convenient in handling outlying jobs. The transfer conveyor is powered by a 15-hp. Leroi gasoline engine, and has a 90-cu. ft. hopper which is charged by dry-batch trucks. These trucks are driven up to a level above the hopper over a simple planked dirt ramp, and the dry batch is conveyed and charged into transit mixers at or close to out-lying jobs. By the use of the batch transfer conveyor, a delivery rate up to 60 cu. yd. per hour is maintained at points as far as ten miles from the plant. Water is put into the mixers at the job site.

Plant No. 1, the only permanently located unit, is near a railroad to receive cement in bulk. The railroad siding is on a fill adjoining the plant,

Above: Transfer batch conveyor in use on outlying jobs to cut down truck mileage

Below—One of two semi-portable batching plants for ready-mixed concrete operated principally to serve large projects



and cement is unloaded from box cars by a Link-Belt power scraper and elevated into bins of 350 bbl. and 600 bbl. capacities. Aggregates are dumped directly into a bin which has a capacity of 25 cu. yd. in each of three compartments. This plant has a 2-cu. yd. weigh batcher. It also is equipped with a 75-hp. Kewanee boiler for winter operation.

Ready-mixed plant No. 2 has a portable 51-ton Blaw-Knox two-compartment bin with folding legs and extensions, and a 21-cu. ft. concrete scale.

Screened gravel and sand are handled from stockpiles with a two-drum, 40-hp. electrically driven Rogers hoist operating a loose-line, 1-cu. yd. drag scraper. This plant is fitted with a 30-hp. Ledgerwood boiler for heating water, which is pumped from the lake at No. 4 gravel plant by a 2-in. Gould pump.

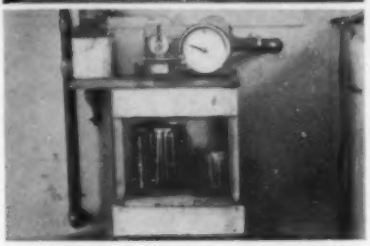
Originally this plant was laid out to handle cement in bags, the cement being dumped into a hopper and conveyed up and into the collection chute.

Special Bulk Cement Truck

When plant No. 3 was erected at Lowry field, a special bulk cement truck was developed to deliver bulk cement to it, and also to plant No. 2, from plant No. 1 on the railroad siding. The special, tight steel body, holding the equivalent of 200 sacks of cement, is mounted on a Ford chassis equipped with Thornton tandem 4-wheel drive. The cement is first "batched out" in plant No. 1 and then dumped (end dump body) into a hopper at the other plants, where screw conveyors and a bucket elevator carry the cement into the bins.

Plant No. 3 has a three-compartment bin; two for aggregates and one for cement, each of 35-cu. yd. capacity. Sand and gravel are trucked to the plant and elevated into the bins by two bucket elevators. Capacity for cement in storage is 1000 sacks. The batcher is 4-cu. yd. capacity with a three-beam scale. Cement and aggregates are weighed in the one hopper and are discharged into the mixer drum simultaneously.

Water is measured into the truck mixer tanks from the city mains by a meter manufactured by Automatic



Top: Lloyd S. Brannan, one of partners, with bulk cement truck as his background. Bottom: New metering device for mixing water

Liquid Meter Co. Water is delivered at the rate of 120 g.p.m. through a 2-in. line under city water pressure.

The company operates seven truck mixers, three Rex units of 3-cu. yd. capacity and four Rex units of 4-cu. yd. capacity mounted on White trucks.

This combination of a permanent plant properly located, semi-portables, and a transfer batching conveyor has been the means of serving large jobs with maximum yardage and at a minimum length of haul.

New Ready Mix Plants

C. J. Horner Co., Hot Springs, Ark., has completed building a new ready-mixed concrete plant and has purchased two mixer trucks. H. E. Horner, president, also operates a building supply business.

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The Whittemore Co., Roslindale, Mass., is planning to build a ready mixed concrete plant at Lowell, Mass., which will consist essentially of an elevator, a hopper, and loading platforms. It will be built near the Boston & Maine railroad tracks where the cement and sand will be delivered in carload lots.

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W. J. Bremer, buiding supply dealer in Savannah, Ga., has installed a ready mixed concrete plant. Included in the equipment is a 110-ton capacity Blaw-Knox bin, a Northwest crane to charge the bin, and four new truck mixers.

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Sam F. Dalton, Inc., Columbia, Mo., has gone into the ready-mixed concrete business, with a new batching plant and two transit mixers.

Left: View of plant, showing molds in the racks on rails and stockpiles of units. Right: Details of construction using interlocking blocks and reinforced studs

Interlocking Concrete Block

Design of new building block provides for vertical stud reinforcing but requires no mortar

By HEBE HILLIS

AFTER MANY YEARS of experimental work, a concrete building block has been developed which is designed to have all the advantages of other building blocks and which is said to have fewer disadvantages. This block, manufactured by Lamont & Young at White Salmon, Wash., is a light, hollow interlocking precast concrete unit. It makes a wall which is stiff, strong, and of durable construction.

Wall thicknesses are 6, 9 and 12 inches and the cross members govern the width of the wall. The 6-in. cross member weighs three pounds; the 9-in. four and one quarter pounds; and the 12-in. five and one third pounds. The slab, or wall member, is 1¼-in. thick, 9-in. high and 16-in. long, weighing thirteen pounds. All members being light, they are easily handled and allow a wall to be laid up very rapidly.

Manufacturing Procedure

Units are cast in aluminum molds so that they are lightweight for stripping, and have accurate dimensions. The molds are laid on edge in racks about six feet long, the back of one mold becoming the face of another. A rack holds approximately 50 square feet of wall, and rests on a small car truck on tracks.

When the molds have been placed in racks they are first sprayed with a light form oil. The oil is allowed to drain into pans catching most of the oil and saving it for re-use. Molds are then tightened in the racks by means of rods fastened on the sides; then they are wheeled under the mixer spout and are ready for the pouring operation.

Concrete for keys, or cross members, is composed of one part portland cement to three parts of ½-in. minus gravel. Slabs, or side members, are one part cement to five parts ½-in. minus gravel. Enough water is used to make a smooth flowing plastic mass and the racks are subjected to a jolting action to give a smooth, dense product. After the initial set takes place, the molds are given a float finish, and are allowed to set 18 to 24 hours before stripping.

Loaded racks are wheeled to the stockpile area for the stripping operation. After stripping, the units are stacked on edge on the ground in rows. Two men can pour and strip 500 sq. ft. of wall area per day. As soon as the stripping is done a fine stream of water is continually sprayed over the product for 20 to 30 days, or until cured. The principal cost and capacity of a plant is dependent upon the number of molds used.

The footing, or foundation, should be poured with good workmanship,

Apartment building of interlocking concrete wall block which has been pointed in preparation for stucco. Note reinforced concrete around all openings

making a smooth level top surface ready for laying the blocks. If the building is to be erected on a steep hillside the foundation is stepped up in multiples of nine so that the block, as it is built up, will be kept on a level. Forms at the corners are then put in place, and merely consist of two 1-x12-in. boards nailed together on edge.

No mortar of any kind is used in the laying of the interlocking block. Blocks are laid from any one corner by just locking them together, which is a simple operation. A square foot of wall is made when pairs of two keys and two slabs are placed together. From each corner a string line acts as a guide in laying a true wall. This is continued until the wall is built up to convenient height of about four courses.

When locked together, the units in a 9-in. wall form a 6½- x 12-in. hollow space and a 2- x 6½-in. hollow space at the ends of the units. This small hollow, or stud, occurs at 16 in. intervals and when poured full of small aggregate concrete becomes the bearing part of the wall. Two bars of ¼-in. reinforcing steel are placed in this stud continuous to the plate.

The studs are poured as construction of the wall proceeds. Light forms are constructed for all openings, which are poured with concrete. All corners are poured solid.

At the story, or ceiling, height a solid horizontal concrete plate is cast with reinforcing bars, giving a horizontal tie. The concrete and steel in the plate ties in with the concrete and steel in the studs and corners, spanning the hollow portion between the studs.

In two-story work a 12-in. wall is used for the first story, and a 9-in. wall for the second. This set-back of three inches at the plate gives a bearing for the floor joist. Tie rods are anchored into the plate and the joist at regular intervals, holding the wall together.

The building, as now erected, is ready for pointing. Each slab has a ½-in. bevelled edge which allows a good key bond for pointing. This can either be done by hand or with a stucco gun. The pointing is allowed to set in order to take up shrinkage; when this is effected a stucco finish is applied to the outer surface.

The slabs have been used for porch surfaces, patios, or walks, with various designs being placed in about an inch of concrete, and with the joints sometimes filled with contrasting colors or moss. Thomas C. Lamont and David Young are owners of the business.

Volcanic Aggregate Block

NATURE has produced an unusual aggregate for the Dura-Bloc Co., Blackfoot, Idaho, a lava cinder which is hard, porous and of a reddish tinge. An almost inexhaustible supply of this aggregate is to be found in the 320-acre deposit of the cinder concrete block company which is owned and managed by Dr. J. O. Hampton, a physician with offices in Blackfoot. The aggregate is loose and is easily excavated by horse-drawn scoops, and then transported to the plant by truck.

At the plant the aggregate is reduced to proper size by an Allis-Chalmers double-roll crusher. Mixing is done with a 22-cu. ft. Stearns batcher, and the block are made on an electric-powered Stearns clipper block machine.

Tests made at the University of Idaho on lava cinder blocks 18 days

Plant of Dura-Bloc Co., Blackfoot Idaho and the truck and trailer unit used to make deliveries

old, made with a one to seven mix containing no sand, show 813 p.s.i. and an absorption of about 10 percent. A standard 8- x 8- x 16-in. block averages 30 lb. The color of the finished block appears to change with the different times of the day.

Ready Mixed Concrete Figures in Union Trials

JUDGE PEYTON GORDON of the District of Columbia Federal District Court has ruled, in a recent case, that labor unions do not enjoy blanket exemption from prosecution under the anti-trust laws. The court sustained an indictment against a Washington local of the International Brotherhood of Teamsters, an American Federation of Labor union, and five of its officials in a dispute with a local of the International Brotherhood of Operating Engineers, also A. F. of L. The dispute held up many large government and private construction projects.

The government accused the teamsters of a criminal conspiracy to restrain trade. It was charged that the teamsters tried to induce companies operating concrete-mixer trucks to employ members of the teamsters union rather than members of the engineers union; coerced the companies to break contracts with the engineers local; coerced drivers to resign from the engineers local and join the teamsters; called and assisted in calling strikes.

The dispute between the two unions has been settled, the settlement transferring the drivers of the trucks from the engineers union to the teamsters union, but the government still intends to press the case. The defendant union, according to Justice Gordon is in violation of trade and commerce and had as its object the breaking down of collective bargaining between the engineers and the concrete companies.

Houston, Texas, Has New Concrete Pipe Plant

HOUSTON CONCRETE PIPE CO., Houston, Texas, has placed into operation a new concrete pipe plant equipped to produce 4- to 32-in. diameter pipe at the rate of a carload per day. Equipment soon is to be installed to manufacture 48- and 60-in. diameters pipe.

Two views of new Blaw-Knox plant built for Ready Mixed Concrete Co., Indianapolis, Ind. A 22-ft. diameter composite bin has two 100 ton and two 50 ton aggregates compartments; also one of 325-bbl. capacity for cement. Batching equipment comprises a 2-cu. yd. weigh batcher for five materials, a 150-gal. water weighing tank and 2-cu. yd. mixer. Cement and aggregates are handled into the bin by bucket elevators

The Latest in Concrete Vault Plants

AMERICAN VAULT CO., New York, N. Y., has completed construction of a new concrete vault plant and main office in the Glendale section of Brooklyn, N. Y. The new plant is equipped with a complete laboratory for testing raw materials and the strength and water-tightness of the vaults. An air-conditioned display room has been built for the accommodation of funeral directors and their clients. The company has been manufacturing concrete vaults in metropolitan New York since 1911.

Ready-Mixed Concrete for Alaska

ANCHORAGE SAND AND GRAVEL CO., Anchorage, Alaska, has completed improvements to its plant, which include rebuilding of the bins, new vibrating screens, electric motors, washing equipment and purchase of a ⅜-cu. yd. Bucyrus-Erie 10-B shovel. The plant is a slackline operation with a capacity of 250 cu. yd. of sand and gravel in 8 hr. Arthur Waldron, operator of the plant, intends to install a crusher and to provide contractors with ready-mixed concrete.

To Make Pipe

PLATTSBURGH STONE PRODUCTS CORP., Plattsburgh, N. Y., expects to manufacture reinforced concrete pipe at a plant on quarry property. Pipe from 8-in. to 54-in. in diameter will be made.

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THE UNITED STATES CONCRETE PIPE CO., has changed its principal office from Columbus, Ohio to Cleveland. The firm was incorporated in September, 1936 with an authorized capital of 500 shares of no par value common stock by John V. McLaughlin, Harold Voelker, and Miss A. M. Francis, secretary. S. O. McFall, Cleveland, is president, and John J. Satow, secretary.

Gravel Company Going Into Ready Mix

J. D. ROQUEMORE of the Roquemore Gravel Company, Montgomery, Ala., has announced that a new ready-mixed concrete plant will be built near this city. The capacity will be about 300 cu. yd., and six trucks will be used.

Ready-Mixed Concrete in Kansas City

STEWART SAND AND MATERIAL CO., Kansas City, Mo., has invested $100,000 in ready-mixed concrete equipment and will soon start operations with a fleet of ten mixer trucks.

Industrial Coal Price Increase Proposal

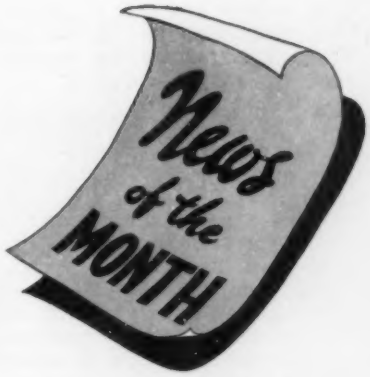
INDUSTRIAL USERS of coal will have to stand a good share of the price increases recommended by examiners of the Bituminous Coal Division, over the prices which prevailed in 1937, according to an analysis of the suggested prices made public in Washington. On the whole, the average price of soft coal would be 11c a ton higher than the average in 1937, when government regulation was not in force. Railroads would foot a coal bill increased by over $5,000,000 annually, according to estimates.

Phosphate Market Affected by War

TENNESSEE PHOSPHATE plants are continuing to be active, although prices are somewhat adversely affected by the European war which has necessitated sale of some Florida phosphate, which normally would be exported, on the domestic market. Exports have been reduced 10 percent and domestic consumption is up 5 percent, with a 5 percent drop in price for the total. Florida's total production dropped 4 percent, while production in other states increased 4 percent. A long war is expected to increase domestic consumption materially with high prices following as they did in the 1917-1919 period.

Millard Installs Another Rotary Lime Kiln

H. E. MILLARD, Annville, Penn., has doubled his capacity for lime by installation of a second F. L. Smidth Unax rotary kiln. A complete description of the plant and all of Mr. Millard's activities at the time the plant was built and the first 290-ft. kiln went into operation appeared in ROCK PRODUCTS, August, 1937, pp. 45-58.



Silica Company Wins Important Lawsuit

SILICA PRODUCTS CO., INC., Batesville, Ark., operator of a silica plant at Guion, Ark., has won an important decision in court, whereby an employe was denied damages allegedly contracted while working at Guion. The employe contended that the company did not furnish proper respiratory equipment. The Arkansas Supreme Court, in affirming a previous decision of the Izard county chancery court denying damages, held that the employe assumed the risk of contracting occupational disease when he knowingly worked without proper equipment.

Monolith Plans $1,000,000 Plant Investment

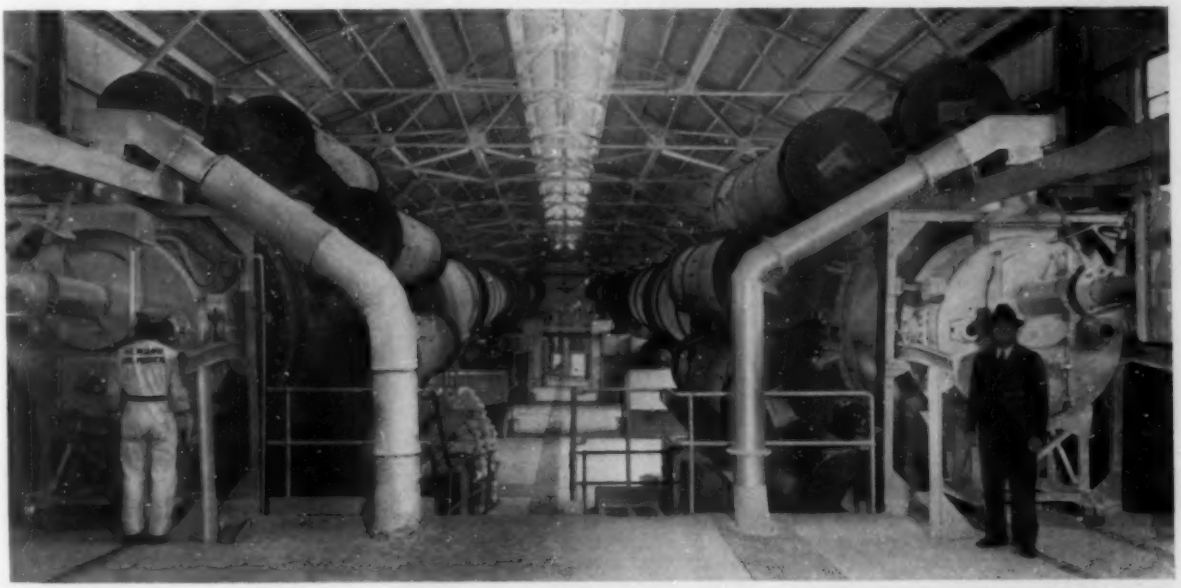
MONOLITH PORTLAND CEMENT CO., Los Angeles, Calif., is planning a $1,000,000 investment involving installation of the world's largest cement kiln and an additional outlay of $100,000 for a gypsum plant, according to California newspaper reports. The new kiln for the cement mill at Monolith, Calif., will increase capacity by 1,500,000 bbl. per year, it is said. Location of the gypsum plant is still undecided, but company engineers have located a large gypsum deposit 160 miles from Monolith.

Large New England Sand and Gravel Plant

A LARGE CRUSHING plant has gone into operation in a gravel pit near Franklin, N. H., to produce aggregates for the construction of a flood control dam. The plant was installed by Kennedy-Van Saun Manufacturing and Engineering Corp., New York City, and is scheduled for operation day and night.

New Aggregates Plant To Be Built in Texas

J. W. HARTMAN CONSTRUCTION CO., has been testing sand and gravel lands and will locate a modern sand and gravel washing plant at Malakoff, Texas, on the Trinity river. The new plant will produce concrete sand and gravel, plaster sand, roofing gravel and other products.



This is how the interior of H. E. Millard's (he's on right) rotary kiln lime plant looks from the operator's floor after installation of a second kiln.

California Stone Plant to Be Improved

San Leandro Rock Co., San Leandro, Calif., has been purchased by U. B. Lee, San Leandro contractor, builder and real estate developer. Mr. Lee plans to install considerable equipment and has established a new office at 1159 Estudillo Ave. Chris Hopper, manager of the plant for 12 years, will continue in charge.

Portable Crushing Plant in Operation

W. J. Durnford, Bloomington, Wis., has placed into operation a large, Diamond Iron Works portable crushing and screening plant at Prairie du Chien, Wis. The quarry unit consists of a 15- x 24-in. jaw crusher, 30-in. x 5-ft. apron feeder, 26- x 20-in. roll crusher, 4- x 8-ft. single-deck vibrating screen, belt conveyors and a vertical "roto-lift" elevator. It is a self-contained unit on pneumatic tires and with a 90 to 100-hp. Murphy Diesel engine mounted overhead.

Highways Pay Their Way

Chairman Joseph B. Eastman of the Interstate Commerce Commission, in a special report based on a five-year study of the entire subject of public aids to transportation, revealed that motor vehicle users as a class have fully paid in taxes and fees their share of highway construction and maintenance costs since 1927. Contrary to general belief, said Mr. Eastman, highway users have not been recipients of public aid or subsidy. Certain types of heavy motor vehicles used in competition with other forms of heavy transportation have paid more than their share of highway costs, according to the report. The report finds that motor vehicle users as a class for the period 1921 through 1937 paid $385,000,000 more than their share of highway costs and the trend in that direction is upward. These findings dispose of the contention of the railroads that highway users are greatly subsidized.

Government To Check Into Gypsum Industry

Department of Justice, anti-trust division, has started its investigation into alleged monopolistic practices of the gypsum industry. It is attempting to prove that a handful of companies, including the "big three," have managed to get hold of the principal sources of raw materials and that they are building up a monopolistic control over patents and manufacturing methods. The implication is that by so doing the industry has deprived home builders of much of the savings secured through technological progress.

On the other hand, the big gypsum companies are prepared to contend that development of new methods has enabled the widespread use of gypsum products which would not otherwise have been possible. United States Gypsum Co., National Gypsum Co. and Certain-Teed Products Co. are said by the government to manufacture about 90 percent of all plaster board and 80 percent of all gypsum products used in the building industry. Investigators say that the number of producers has been cut in half since 1929. Data on the industry is scheduled for presentation before the grand jury in Washington where an indictment will likely be returned.

New Cement Silos for Distribution Plant

Marquette Cement Manufacturing Co., Chicago, Ill., has awarded a contract for construction of two additional concrete silos at the Memphis, Tenn., packing plant to S & W Construction Co. The expenditure of about $100,000 will increase the storage capacity 60 percent and will provide more units for handling several cements.

$800,000 Cement Plant Improvement Under Way

Santa Cruz Portland Cement Co., Davenport, Calif., expects to complete its plant rebuilding program by September 1. Dinwiddie Construction Co., contractor, has already completed construction of eight storage silos totalling 160,000 bbl. capacity and is working on the kiln installation which will be a Polysius Corp. Lepol kiln. Col. R. W. Ryder, Pacific coast representative for the machinery company, will direct installation of the equipment. The new plant will include up-to-date dust control equipment.

Exploring Gypsum Deposit in Arkansas

United States Gypsum Co., Chicago, Ill., has been exploring a gypsum deposit in Pike county, Ark., and has been sinking test holes to determine thickness of the bed and overburden. Workmen employed by the state mineral survey had discovered the gypsum, ranging in thickness from 3 to 24 ft. and covering a two mile by one half mile area.

May Re-Open Carolina Quarry

Raleigh Granite Co., Raleigh, N. C., may re-open its quarry at Neverson, N. C., according to newspaper reports. This quarry is one of the largest in that section of the State, but was closed a number of years ago. It is also reported that the company is considering purchase of additional property in the vicinity and the installation of additional equipment.

Relocating Sand and Gravel Plant

Modern Sand and Gravel Co., St. Louis, Mo., has moved its Pacific, Mo., plant to Yeatman, near Jedburg, Mo., and is opening a new sand and gravel deposit. The Pacific deposit had been depleted.

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Alpha Portland Cem. Co.	$ .25	June 25
Arundel Corp.	.25	April 1
Eastern Magnesia Talc Co.	1.00	March 30
Kelley Island Lime & Transport Co.	.25	March 30
Lehigh Portland Cem. Co.	.37½	May 1
Lehigh Portland Cem. Co., pfd.	1.00	July 1
National Gypsum Co.	1.12½	June 1
Pacific Portland Cem. Co., pfd. (Arrears April 30, 1940, $39.87½)	1.00	April 29

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CONSOLIDATED CEMENT CORP., Chicago, Ill., announced at the annual meeting that the net income for 1939 totaled $174,825 as against $39,572 in 1938. Net sales in 1939 were $1,590,955 as compared with $1,326,507 in 1938. The company also announced that the voting trust had been terminated and the holders of voting trust certificates should now exchange such certificates for definitive class A stock certificates. As of February 1, 1940, interest on the company's 6 percent bonds and notes became fixed and payable whether or not earned.

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AMERICAN AGGREGATES CORP., Greenville, Ohio, had the following comparative income statements for the years ended December 31, 1939 and 1938:

	1939	1938
Net sales	$1,380,754	$1,316,564
Cost of sales	954,306	967,363
Selling, etc., expense	153,271	148,977
Depreciation & depletion	184,706	202,624
Operating profit	88,471	d 2,400
Margin of profit	6.41%	———
Allied operating income	76,384	179,300
Other income	107,807	99,610
Total income	272,662	276,510
Interest, etc.	20,744	28,741
Loss, assets sold	5,254	31,462
Federal income tax	55,573	47,509
Net income	191,091	168,797
Earnings, preferred share	$15.46	$10.44
Number of preferred shares	12,364	16,161

Under other income, for 1938, is included a profit of $51,443 from bonds retired.

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LONE STAR CEMENT CORP., New York, N. Y., has released the following income statement for the calendar year ended December 31:

	1939	1938
Sales	$21,085,781	$20,458,971
Manufacturing, etc., expense	10,742,863	10,957,168
Selling, etc., expense	2,978,249	2,718,174
Depreciation and depletion	2,674,040	2,792,816
Operating profit	4,690,630	3,990,814
Margin of profit	22.25%	19.51%
Other income	182,712	167,075
Total income	4,873,342	4,157,889
Miscellaneous charges	278,452	266,400
Income tax, etc.	1,033,796	989,704
Net income	3,561,094	2,901,784
Common dividends	3,137,014	2,885,516
Surplus for year	424,080	16,268

President Charles L. Hogan, in submitting his annual report to the stockholders, commented on additions to plants and properties totalling $1,251,216.78 in 1939. The sum included the purchase of two new electric shovels (one for New York and one for Cuba), unit coal pulverizers at the Greencastle, Ind., and Spocari, Ala., plants and additional cement silos at the New Orleans, La., mill.

Capital expenditures totaling $1,856,650, have been authorized for additions and improvements to plants during 1940. Of this amount, $876,000

has been authorized for the Hudson, N. Y. plant, including the construction of modern cement storage silos and a new shipping plant.

Mr. Hogan reported that the corporation's domestic mills operated at 48 percent of capacity and the foreign mills at 75.6 percent capacity, an average of 56.7 percent for all the mills. This compares with 42.6 percent, 72.3 percent and 52.3 percent, respectively, in 1938. Bureau of Mines reports show that the domestic cement industry operated at 47.2 percent of capacity in 1939 and 41 percent in 1938. Operations at six of the Lone Star domestic mills were conducted throughout 1939 without a lost time accident.

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PENNSYLVANIA GLASS SAND CORP., Lewistown, Penn., for the years ended December 31, 1938 and 1939, had the following statement of income:

	1939	1938
Net sales	$2,568,444	$2,244,968
Costs and expenses	1,490,668	1,329,256
Depreciation and depletion	193,285	194,683
Operating profit	884,490	721,029
Margin of profit	34.44%	32.12%
Other income	33,375	33,294
Total income	917,865	754,324
Bond interest	192,259	196,625
Bond discount, etc.	27,961	29,164
Federal taxes	141,767	92,892
Net income	555,878	435,643
Preferred dividends	173,376	175,642
Common dividends	241,328	160,885
Surplus for year	141,174	99,116
Earnings surplus, 1-1	672,782	573,667
Earnings surplus, 12-31	813,957	672,782
Times charges earnings	4.17	3.34
Earnings, preferred	$22.44	$17.59
Number preferred shares	24,768	24,768

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MONOLITH PORTLAND MIDWEST CO., Los Angeles, Calif., had the following income statement for the calendar years ended December 31, 1939 and 1938:

	1939	1938
Operating profit	$120,014	$272,787
Other income	7,556	3,512
Total income	127,570	276,299
Interest, etc.	10,664	23,023
Federal taxes	25,080	47,200
Special appropriations	.....	75,000
Net profit	91,826	131,075
Preferred dividends	52,694	53,085
Surplus for year	39,132	77,990
Earning surplus, 1-1	101,200	117,726
Credits	.....	8,114
Debits	.....	102,629
Earning surplus, 12-31	140,333	101,200
Earnings, preferred share	$0.44	$0.62
Earnings, common share	(d)0.25	(d)0.12
No. of preferred shares	210,039	212,341
No. of common shares	300,000	300,000

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ROCKLAND-ROCKPORT LIME CO., INC., Rockland, Me., had a net profit, before depreciation, of $21,627 for 1939 as against a deficit of $14,390 in 1938.

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PENNSYLVANIA-DIXIE CEMENT CORP., New York, N. Y., and subsidiaries report for the 12 months ended March 31, 1940, a profit of $399,888 after ordinary taxes, depletion, depreciation, interest, etc., but before federal income taxes, comparing with a profit of $205,199 for 12 months ended March 31, 1939. At the annual meeting of the board of directors, Chairman Victor N. Roadstrum reported that shipments in the first quarter declined 13,000 bbl. from the amount shipped a year ago. However, he reported unshipped tonnage of orders on hand as greater than a year ago.

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DIAMOND PORTLAND CEMENT CO., Middle Branch, Ohio, had a net income of $45,671 in 1939 as against $116,358 in 1938.

DOLESE & SHEPARD CO., Chicago, Ill., had the following income statement for the calendar year ended December 31, 1939 and 1938:

	1939	1938
Operating profit	$67,305	$103,681
Depreciation	44,500	45,121
Net profit	22,805	58,560
Dividends	———	18,248
Surplus for year	22,805	40,312
Earning surplus, 1-1	29,281	d 11,031
Earning surplus, 12-31	52,086	29,281

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NEW ENGLAND LIME CO., Adams, Mass., reported a net income of $29,973 for the year ended December 31, 1939. This compares with a net income of $275 in 1938. Net sales were $535,428 in 1939 as against $442,704 in 1938.

HOOSAC VALLEY LIME CO., INC., Adams, Mass., had a net profit of $15,424 for the year ended December 31, 1939, after charges and taxes.

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YOSEMITE PORTLAND CEMENT CO., Merced, Calif., had the following income accounting for the years ended December 31:

	1939	1938
Net sales	$793,281	$807,880
Cost of sales	570,170	602,359
Selling, etc., expense	138,096	137,295
Operating profit	85,015	68,226
Margin of profit	10.72%	8.45%
Other income, net	20,478	9,669
Total income	105,494	77,895
Federal income taxes	13,304	13,700
Other deductions	18,405	....
Net income	73,785	64,194
Preferred dividends	102,697	102,154
Deficit for year	28,912	37,960
Surplus, Jan. 1	221,517	261,154
Adjustments	2,406	1,677
Surplus Dec. 31	195,011	221,517
Earn., preferred share	$0.29	$0.25
No. of preferred shares	256,978	256,433

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MARBLEHEAD LIME CO., Chicago, Ill., had the following income account for the years ended November 30:

	1939	1938
Net sales	$1,255,968	$1,046,827
Cost of sales	1,065,753	848,727
Selling, etc., expense	179,846	150,105
Operating profit	10,369	47,995
Margin of profit	0.83%	4.58%
Other deductions	2,877	12,286
Balance	7,492	35,709
Bond interest, etc.	29,631	30,241
Net profit	(d)22,139	5,468
Surplus, Dec. 31	170,855	138,087
Adjustments	15,755	27,300
Surplus, Nov. 30	132,962	170,855
Times charges, earnings	0.25	1.18
Earnings, preferred shares	Nil	$1.59
Number of preferred shares	3,430	3,430

•

FLORIDA PORTLAND CEMENT CO., Chicago, Ill., had the following statement of income for the years ended December 31, 1938 and 1939:

	1939	1938
Net sales	$2,057,037	$1,437,551
Cost of sales	1,116,853	882,589
Operating expenses	319,714	332,399
Operating profit	620,470	222,563
Margin of profit	30.16%	15.48%
Other income	5,150	20,573
Total income	625,621	243,136
Miscellaneous charges	———	22,006
Federal income taxes	118,000	35,000
Net income	507,621	186,130
Preferred dividends	349,797	174,899
Surplus for year	157,824	11,231
Surplus, Jan. 1	170,565	159,333
Surplus debits	121,638	———
Surplus, Dec. 31	206,751	170,564
Earned preferred share	$10.16	$3.72
Number of preferred shares	49,971	49,971

Net income, after depreciation and depletion, was $174,174 for 1939 and $161,319 for 1938.

•

LONGHORN PORTLAND CEMENT CO., San Antonio, Texas, has decreased capital stock from $1,250,000 and 250,000 shares no par value to 250,000 shares no par value and $550,000.

NEW YORK TRAP ROCK CORP., New York, N. Y., directors have authorized a dividend payment of $1.75 per share on preferred stock, payable April 1, 1940, to holders of record March 20. The payment covers the three month payment ended March 31, 1940, and settles preferred stock dividends in full to that date. The sinking fund on first mortgage bonds and participation payments on the 7 percent sinking fund debentures, under terms of respective indentures, to correspond with the dividend payment, have been authorized and will be provided for.

The corporation has issued the following income account for the years ended December 31, 1939 and 1938:

	1939	1938
Gross profit	$1,531,085	$1,160,371
Administration, etc., expense	414,730	502,329
Depreciation & depletion	548,337	422,568
Operating income	568,018	235,474
Other income	73,839	36,002
Total income	641,857	271,476
Bond interest	258,826	280,648
Other interest, etc.	38,779	41,270
Balance	344,252	50,442
Federal income tax	19,252	7,699
Property sold	169,138	8,201
Other deductions	74,732	24,954
Minority interest	.....	249
Net income	81,130	(d)91,047
Preferred dividends	77,336	77,336
Common dividends	44,973	.....
Surplus for year	(d)41,179	(d)168,383
Surplus, Jan. 1	3,795,132	3,941,971
Credits	49,977	21,544
Debits	862,716	.....
Surplus, Dec. 31	2,941,213	3,795,132
Times charges earn.	1.34	0.74
Earnings, preferred shares	$7.34	Nil
Number of preferred shares	11,048	11,048
Earnings, common shares	0.02	0.94
Number of common shares	179,890	179,890

•

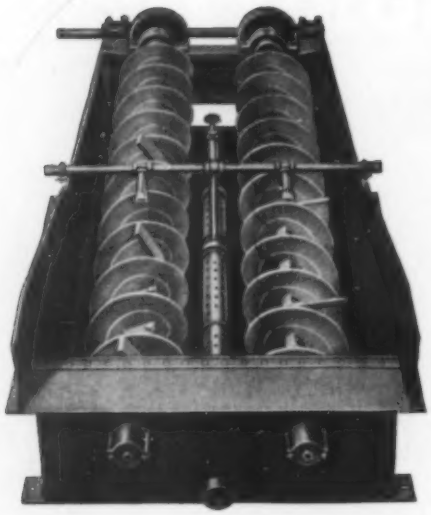
RIVERSIDE CEMENT CO., Los Angeles, Calif., had the following statement of income for the years ended December 31:

	1939	1938
Gross profit	$578,494	$757,859
Depreciation and depletion	353,265	372,550
Federal income tax	16,676	54,092
Net income	208,553	331,217
1st preferred dividends	212,147	224,783
Surplus for year	(d)3,594	106,434
Earnings, 1st preferred shares	$6.15	$9.04
Earnings, class A shares	Nil	0.44
No. of preferred shares	33,892	36,655
No. of class A shares	240,000	240,000
Earnings, class B shares	0.88	0.56
No. class B shares	345,000	345,000

•

PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., had the following statement of income for the years ended December 31, 1939 and 1938:

	1939	1938
Sales	$1,690,519	$1,945,221
Cost of sales	1,329,822	1,508,525
Selling, etc., expense	240,571	268,233
Depletion	18,961	25,129
Depreciation	159,664	229,279
Operating loss	58,500	85,945
Other inc., net	30,440	dr 28,296
Net loss	28,060	114,241



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WASHING PROBLEM

This Twin Spiral Screw Washer is made to thoroughly scrub all aggregates and to remove mud, silt, coal, leaves, sticks, shale and some types of clay balls; and to give you a product which will meet the strictest specification requirements. Also, you can profitably work deposits which heretofore have been considered impossible.

From our complete line of aggregate washing machinery you will find the one best fitted for your needs and problems.

For further details write for descriptive literature on EAGLE SCREW WASHERS, EAGLE PADDLE LOG WASHERS and EAGLE "SWINTEK" SCREEN NOZZLE LADDER.

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Means Increased Mill Output for the Cement Industry!

The GAYCO Centrifugal Air Separator removes all fines as they are made, thereby preventing the cushioning effect of the fine material. Coarse particles are rejected by a new type adjustable centrifugal sizing fan which is an exclusive GAYCO feature. With a GAYCO in your plant it will be easier to maintain a pre-determined circulating load and you can increase your mill capacity 25 to 40% with 25 to 30% greater recovery of fines.

It can be easily adjusted to deliver products of any desired screen analysis from 60 to 400 mesh and when once adjusted is not affected by variation of speed or rate of feed. Always produces the same uniform product at the same setting. Adjustment for any product can be noted and returned to at any time.

Let our engineers give you the benefit of their many years' experience and show you how the GAYCO Centrifugal Air Separator can pay for itself in your plant.

We also manufacture Bucket Elevators—Bin Gates—Belt Conveyors—Feeders—Grizzlies—Rock Crushers—Revolving Screens and furnish complete crushing, screening and washing plants for crushed stone or sand and gravel.

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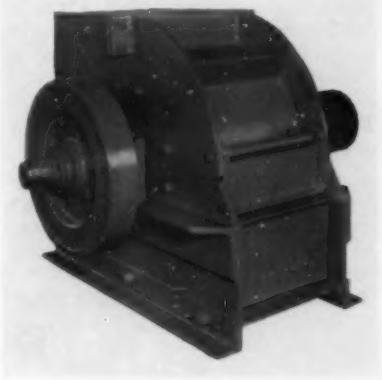
GAYCO CENTRIFUGAL SEPARATORS

NEW MACHINERY * NEW EQUIPMENT

Crushers for Agstone and Aggregates

EAGLE CRUSHER CO., INC., Galion, Ohio, announces two additional sizes of hammer mills for the production of road materials or agricultural limestone having a capacity range of 8 tons to 50 tons per hour dependent upon the degree of reduction. The mills are of heavy steel plate, electric welded with a one-piece frame, and are equipped with heavy duty SKF self-aligning bearings. Hammers are



Heavy steel plate hammer mill

of special manganese steel, adjustable and reversible, and the grate bars are of heat treated wear resisting steel and reversible.

Repair Conveyor Belting By Vulcanizing

THE B. F. GOODRICH CO., Akron, Ohio, has announced an addition to its line of belt vulcanizers, which is known as the 36-42. It is made for Goodrich by the James C. Heintz Co.

This recently developed vulcanizer has a platen 12 in. wide and long enough to span a 36-in. belt when the vulcanizer is clamped on the belt at approximately 22½ deg. angle with reference to a line drawn at right angles to the edge of the belt. The vulcanizer also may be used on a 42-in. belt, but it must be placed across the belt at approximately 12 deg. from a line drawn at right angles to the edge of the belt.

The electric heating load is four kilowatts during the heating-up period. Equipped with positive thermostats, the proper vulcanizing temperature of 287 deg. F. is automatically maintained. Current is turned on and off with variations of only

Electric vulcanizer which will handle conveyor belts up to 42-in. widths

one degree in temperature, while an adjusting screw on the side of the control case permits adjustment to any temperature from 220 to 315 deg. F.

Heavy Duty Excavator

THE OSGOOD CO., Marion, Ohio, has announced the Type 90, a new addition to its line of heavy duty excavators. This machine is available as a shovel, with varying boom lengths and bucket sizes up to 2½-cu. yd. capacity, or as a dragline with equipment up to an 85-ft. boom and 2-cu. yd. bucket.

Power may be either by gas, oil or Diesel engine or electric motor and is transmitted to the countershaft by a fully enclosed Morse silent chain, with a disc clutch for power take-off. Swing and travel gears are ball bearing mounted and the drum shaft is mounted on anti-friction bearings. Swing and travel clutches and the swing brake are controlled by Osgood "vacuum control."

Small, Heavy Duty Gasoline Engine

THE HERCULES MOTORS CORP., Canton, Ohio, has developed a small model BXB two-cylinder, heavy-duty, gasoline engine and power unit. Internal dimensions of this unit are as follows: bore and stroke 2⅞- x 3-in., with a displacement of 39 cu. in. Maximum torque is 28 pound feet at 1200 r.p.m., but for continuous peak load service this engine can be operated up to 1800 r.p.m., at which speed it develops 9.2 corrected horsepower.

Although thermo-syphon cooling is standard practice on these two-cylinder engines, water circulating pumps are available. Full force lubrication to all main and connecting rod bear-

Side view of two-cylinder engine

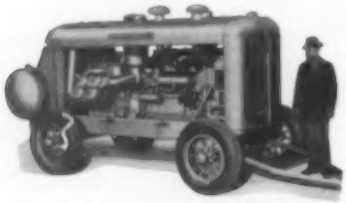
ings is furnished, and the lubricating pump is located in the oil sump and is driven by helical gears from the main camshaft. These engines have L-head cylinders and the valves have 30 deg. seats. The crankshaft is counter-balanced to compensate for the full amount of the rotating mass, plus 45 percent of the reciprocating mass.

All steel excavator of welded construction, available as a shovel or dragline

NEW MACHINERY

Oil- or Gasoline-Driven Portable Air Compressor

INGERSOLL-RAND CO., Phillipsburg, N. J., is manufacturing a new portable air compressor which delivers



Portable compressor equipped with gasoline engine

500 c.f.m. at 100 p.s.i. pressure. Known as the K-500, this machine is a two-stage, air-cooled unit weighing 10,600 lb. The manufacturer furnishes the compressor with either wheel or skid mounting and with the choice of an oil engine or a new-type 6-cyl. gasoline engine which does not require high grade motor gasoline. Another feature is a patented automatic fuel saver which changes the engine speed according to the use of compressed air.

Crawler Shovel With Hydraulic Control

LINK-BELT SPEEDER CORP., Chicago, Ill., has designed a line of crawler shovels of 1½ to 2-cu. yd. capacity, known as series 300, which are equipped with Speed-o-Matic hydraulic (oil) power control and are obtainable with Diesel, gasoline, oil or electric motor drive. This hydraulic control is a feature of the machine, which is said to increase speed and ease of operation. Steering and locking of brakes is done entirely from the operator's position in the cab, and there is incorporated an automatic locking arrangement against involuntary movement of the machine when it is out of travel gear. Ground clearance has been increased to 18 in.

Convertible shovel features hydraulic power control

Mechanical Screen for Testing Gradation

THE GILSON SCREEN CO., Mercer, Penn., has developed a testing screen for sizing test samples of crushed stone, gravel, slag and similar materials. The unit holds five screen trays and a dust pan, which may be placed on the floor under the frame to add another screen tray. Tightening rods on top of the frame are used to fasten or release all trays. One or more screen trays may be left out if

Testing screen which has adjustable control of tray weight to compensate for screen wire replacement

desired, and the screen trays are independently removable.

The screen accommodates up to 100 lb. of sample, is 33 in. high, and is said to make two to seven separations simultaneously in five minutes.

Full Revolving Crane for Heavy Loads

THE GENERAL EXCAVATOR CO., Marion, Ohio, has on the market a new ¾-cu. yd. crane, "the Supercrane," a 24 ton machine that is mounted on a unit wheel mounting and which is said to be capable of lifting and swinging a 6000 lb. load in a full circle, 50 ft. from the machine, without danger of tipping. The basic structure of the dual-tire wheel

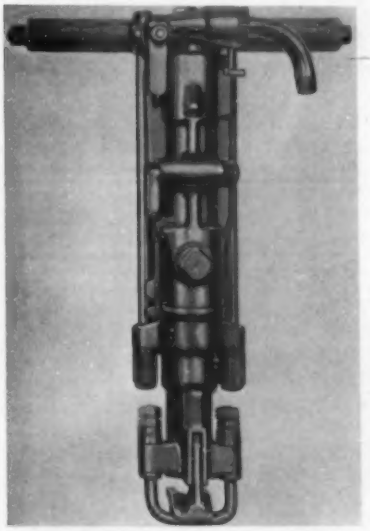
Crane shown hoists and swings at the same time and has two separate brakes for hoisting and swinging operations

mounting is of 20-in. I-beams running the full length of the carriage.

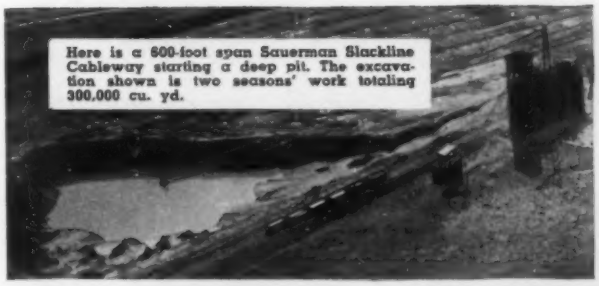
Traveling speeds are 15 miles per hour or more and the machine is self-propelling, requiring one engine, one operator and one set of controls. The crane is said to be able to handle up to 100-ft. booms and has a worm wheel boom hoist independent of the swing clutches.

Lightweight Sinking Drill

GARDNER-DENVER CO., Quincy, Ill., announces the development of its S-73 sinker, a 68-lb. drill designed to fill the need for a drill in a size between the 55-lb. type and the heavier ones weighing 75 to 80 lb. It is claimed that the air consumption is no more than that for the average 55-lb. drill. Its use is recommended for the construction and quarry industries where particularly hard drilling is encountered. The cylinder bushing is surrounded with a large oil reservoir which automatically feeds oil to all working parts.



Medium weight sinker drill



Here is a 600-foot span Sauerman Slackline Cableway starting a deep pit. The excavation shown is two seasons' work totaling 300,000 cu. yd.

DIG, HAUL & DUMP

. . . AT LOWEST COST

Wherever there is a problem of excavating sand and gravel, stripping overburden, stockpiling bulk materials, or other work involving hauls of any distance from 100 to 1500 ft.—it pays to find out what a Sauerman Slackline or Drag Scraper will do and what it will cost. In most cases a Sauerman machine shows a saving in comparison with any other equipment that will dig and haul an equal yardage.

Drag Scraper Storage Unit

Slackline Cableway Excavator

Slackline Scraper Excavator

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430 S. Clinton St. Chicago

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Long Range
MACHINES

Only Jaeger Truck Mixers Give You These Features . . .

- DUAL-MIX ACTION produces higher strength concrete—as proved by the Hollister Tests !
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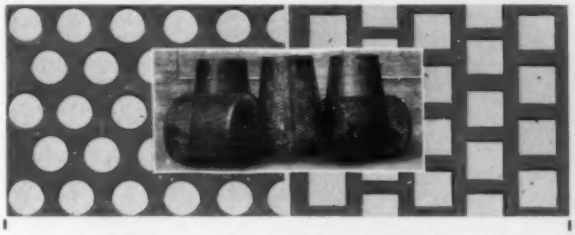
- DUAL-REVOLVING WATER SPRAYS — fastest water distribution; sprays to both ends of drum !
- SYPHO-METER TANK — insures accurate water control !
- VACUUM CAB CONTROL of shock-proof, 2-speed transmission — choice of truck engine or separate engine drive !
- COR-TEN STEEL — lighter, stronger, resists both rust and abrasion !

Send for new catalog showing why Jaeger Truck Mixers far outsell all others.

THE JAEGER MACHINE CO.
603 DUBLIN AVE., COLUMBUS, OHIO



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Lower Production Cost

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Prompt Service *Finest Quality*

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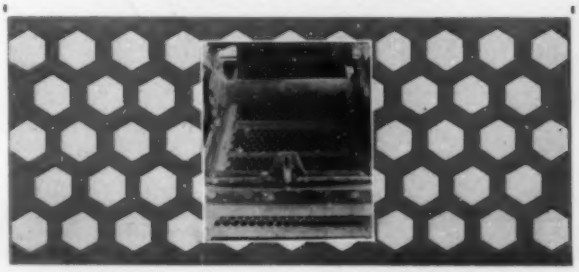
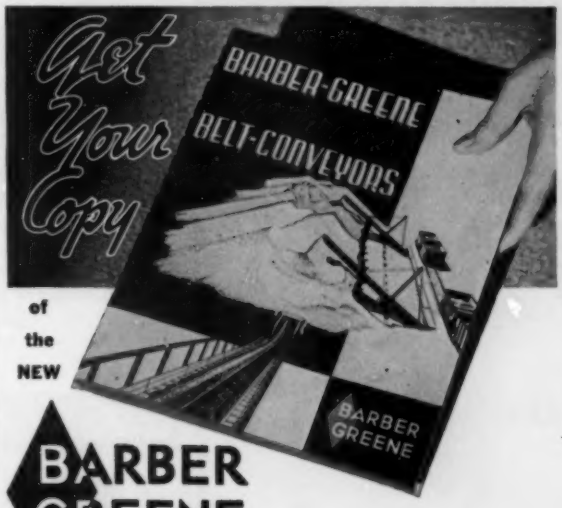
Sales Agencies in Principal Cities





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BELT CONVEYOR CATALOG AND MANUAL

MAIL TODAY— 37-17

Barber-Greene Company, Aurora, Illinois—Gentlemen: Send me without cost or obligation your new 116-page Belt Conveyor Catalog and Manual that not only shows the complete line of B-G *Standardized* Belt Conveyors, but has 20 pages devoted entirely to Engineering Data.

Name.....
Company.....
Address.....
City..... *State*.....

$200,000 Fire Loss To Gypsum Plant

NEWARK PLASTER CO., Newark, N. J., had its plant at Clifton, N. J., destroyed by fire with a loss estimated at $200,000, including $50,000 worth of newly installed machinery.

Considers Record-Breaking Cement Pipeline

THE PERMANENTE CORP., Santa Clara county, Calif., is considering the possibility of constructing a 12 mile pipeline to carry bulk cement pneumatically from its plant near Los Altos to a loading point on lower San Francisco bay, according to Henry Kaiser, Jr., Superintendent. The purpose of the line would be to connect the plant directly with freighters in ports such as Redwood City, Palo Alto or Mountain View. The project is not being considered for the immediate future, but to meet possible expansion of the company into export markets.

Mexican Cement Mill Improves

LA TOLTECA, CIA DE CEMENTO PORTLAND, S. A. Mexico City, Mexico, has in operation a new Polysius Corp. Lepol kiln.

Wage-Hour Law Upholds Employes

AN EMPLOYE may insist on his right under the Wage-Hour Law to collect double the amount of wages and overtime due him, although the employer offers to settle for only the amount due, according to a decision handed down by Justice C. S. Desmond in the New York State Supreme Court in Erie county. In reviewing the decision, the Wage and Hour Division of the United States Department of Labor pointed out that the court held that a contract between an employer and an employe does not prevent the application of the law and that an employe's suit for wages and overtime recovery may be brought in a State court. A defense plea that the Fair Labor Standards Act was unconstitutional was refused.

The decision was made in an action brought to the New York State Supreme Court by a stationary engineer employed under contract by a candy company. The complainant sued for $2456.74, double the overtime wages due him, and the company had offered him $827.22, claiming that was the amount of his overtime. Liability was imposed by the court according to section 16 (b), which provides for the recovery of additional monies for any violation, wilful or not.

Production Renewed

MONOLITH PORTLAND MIDWEST CO., Laramie, Wyo., reopened April 1 for the operating season with a force of 125 men.

•

ALPHA PORTLAND CEMENT CO., Manheim, W. Va. plant, resumed operations March 25 after a shutdown since last November.

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CONSOLIDATED CEMENT CORP., Fredonia, Kan. plant, started operating in the middle of March after a shutdown of 70 days. Prospects for a steady run are reported as favorable.

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UNIVERSAL ATLAS CEMENT CO., Independence, Kan. plant, reopened March 18 after a shutdown since January 1. The plant opened on a 50 percent capacity schedule and will operate continuously during the year. On hand is a single contract for 282,000 bbl. of special portland cement for construction of the Red River dam in Texas.

•

LEHIGH PORTLAND CEMENT CO., Metaline Falls, Wash. plant, resumed operations in March and was preparing for full capacity operation. The Mason City, Iowa, plant started up on April 1.

PRICES BID
Contracts Let

LOWELL, MASS.: Low bidder for city gravel purchases for the year was Superior Construction Co., with a bid of 34.9c per cu. yd. Lowell Sand & Gravel Co., bid 37.5c per cu. yd. and John Brady bid 40c per cu. yd. The contract will be awarded pending the outcome of an investigation of charges that gravel was being delivered short weight.

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OSWEGO, ORE.: Oregon Portland Cement Co., is selling farmers bulk lime for $4.80 a ton and sacked lime for $6.00 per ton. Sale is made at this price as a "grant of aid" under the agricultural conservation program.

•

BURLINGTON JUNCTION, MO.: Agricultural limestone will be furnished to farmers of Nodaway County delivered and spread at $1.85 a ton, delivered to the farm and unloaded at $1.55 a ton, and at the quarry at $1.35 a ton. McDowell Stone Co. of Blackwater has been awarded the contract to furnish the limestone.

Low Cement Bids On California Work

BIDS RECEIVED on 1,500,000 bbl. of low-heat cement for the Central Valley reclamation project in California reached a new low when Calaveras Cement Co. bid 90c, with no discount, on 150,000 bbl. to be delivered 2250 bbl. a day and 53,000 bbl. a month from Kentucky House. The bids of the companies participating were as follows:

LORAIN, OHIO: Bids were received for the city's 1940 paving supplies. Low bidders were as follows: Braun Builders' Supply Co., on 11,000 bbl. of cement at $1.70 per bbl.; Braun Builders' Supply Co., and O. B. Bower Coal Co., on 6000 tons of concrete sand at the dock and 1500 tons on the job, at $1.11 a ton; Braun and Bower, on slag at the crusher at $1.06 a ton; and the Consumers Builders' Supply Co., on slag on the job at $1.19 a ton.

•

TOLEDO, OHIO: Contract has been awarded to the Toledo Concrete Pipe Co. for 20,788 ft. of various size concrete pipe and fittings on its low bid of $25,123.36; to the Columbia Concrete Block & Supply Co. for 6662 concrete block at 16c per block; and to National Cement Block Co. for 2650 concrete barrel block at 17c per block.

•

STOUGHTON, WIS.: Rein & Dahl has been awarded a contract on the Dane county gravel crushing project conducted in coöperation with the W.P.A. to furnish 13,250 cu. yd. at 50c per cu. yd.

•

VALPARAISO, IND.: Contracts for purchase of 15,000 cu. yd. of gravel for repair of county highways were awarded by the county board of commissioners. Jacob Rose, of La Porte, and W. C. Babcock Grain Co., Inc., were given the contracts on a 50-50 basis at 40c per cu. yd.

•

HOUSTON, TEX.: Material dealers have reduced the price of crushed shell 10c per cu. yd. and gravel 5c per cu. yd. sold to the city. Under the new prices, the city will pay 90c per cu. yd. for crushed shell and $1.36 per cu. yd. for gravel.

COMPANY	BID	AMOUNT	DELIVERY SCHEDULE
Riverside Cement Co., Crestmore, Calif.	$1.048	†1,500,000	3000 bbl. daily or 75,000 bbl. monthly
California Portland Cem. Co., Colton, Calif.	1.10		
The Permanente Corp.	.9775	1,500,000	no schedule
Monolith Portland Cem. Co.*	1.22 less 10% 30 days	1,000,000	3000 bbl. daily and 80,000 bbl. monthly
Calaveras Cement Co., Kentucky House, Calif.	.90	150,000	2250 bbl. daily and 53,000 bbl. monthly
Pacific Portland Cem. Co., Redwood Harbor, Calif.	1.00 less 10% 10 days	330,000	1200 bbl. daily and 30,000 bbl. monthly
Beaver Portland Cem. Co., Gold Hill, Ore.	1.65	165,000 maximum	600 bbl. daily and 14,000 bbl. monthly
Santa Cruz Portland Cem. Co.	1.15	300,000 maximum	1000 bbl. daily and 25,000 bbl. monthly
Yosemite Portland Cem. Co., Merced, Calif.	1.016	350,000 maximum	1250 bbl. daily and 31,250 bbl. monthly

† Joint bid.
* A bid was submitted on lesser quantities, all with 10 percent 30 days as follows: 305,000 bbl., $1.04, delivery in April, May and June; 350,000 bbl., $1.15 for delivery April-November; 125,000 bbl., $1.27 for delivery July-November; 395,000 bbl., $1.22 for delivery December 1940-May 1941.

Exploring and Leasing Rock Deposits

QUARTZITE STONE CO., Lincoln, Kan., has leased rock deposits on several farms and is surveying others to determine the quality, amount and problems involved in the production of crushed stone from them. The leasing contracts provide for cash payments to the land owners and for the proration of royalties to the owners on the basis of quality and availability of the stone. A portable air compressor is being used in the exploration work for the drilling of about 300 holes.

France Stone Co. Continues to Expand

FRANCE STONE CO., Toledo, Ohio, has purchased the two quarries of the Raabe Stone Co. at Cloverdale, Ohio, and Fort Jennings, Ohio, and the quarry of the Blosser Stone Co. at Grover Hill, Ohio. J. H. Shroyer of Fort Jennings has been named as the company's representative for Van West, Pauling, Defiance and Putnam counties.

Cement Statistics

BUREAU OF MINES reports that the portland cement industry in March, 1940, produced 7,917,000 bbl., shipped 7,715,000 bbl. from the mills and had in stock at the end of the month 26,098,000 bbl. Production and shipments in March, 1940, showed decreases of 3.1 and 8.9 percent, respectively, as compared with March, 1939. Portland cement stocks at mills were 9.7 percent higher than a year ago.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 161 plants at the close of March, 1939, and 159 plants at the close of March, 1940.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	March 1939	March 1940	Feb. 1940	Jan. 1940	Dec. 1939
The month	37.3	36.3	24.8	28.6	42.9
12 months ended	42.8	47.5	47.8	47.9	46.8

Concrete Pavement Yardage

AWARDS of concrete pavement for March, 1940, have been announced by the Portland Cement Association as follows:

	Sq. yds. awarded during March	Total sq. yds. during first 3 months
Roads	1,826,807	5,853,498
Street & Alleys	659,323	2,351,007
Airports	120,858	337,848
Totals	2,606,988	8,542,353

Group Insurance for Cement Plant Employes

CARNEY CO., INC., Mankato, Minn., manufacturer of cement and rock wool, has acquired a group life insurance policy from the Prudential Insurance Co. of America involving a total of $64,500 for the protection of 79 employes. The policy was issued on the contributory basis, part of the premium being assumed by the employes and the remainder by the company.

Want Gravel Concerns To Pay Royalty

OHIO STATE is planning to take action to force private sand and gravel firms to pay for sand and gravel dredged from Lake Erie. Agitation was started because of a shortage of funds to improve state parks. At present four concerns are dredging sand from the lake. Previous attempts have been made to collect money on a tonnage basis without success.

Unions Will Go to Bat to Get Cement Business

UNIONS AFFILIATED with the American Federation of Labor in Bellingham, Wash., will seek the coöperation of the federal government in making a change in the bid specification for cement to be used on three large projects in Alaska. The bids require that the price be f.o.b. Seattle or San Francisco, it is said, which penalizes the Olympic Portland Cement Co. 25c on freight charges. The unions will request that the bids also provide for f.o.b. Bellingham.

Sand Lime Brick Production and Shipments

NINE active sand-lime brick plants reporting for March and ten for February, statistics for which were published in April.

AVERAGE PRICE FOR MARCH

Detroit, Mich.	....	$14.50
Milwaukee, Wis.	$10.00	12.00
Mishawaka, Ind.	11.00	....
Saginaw, Mich.	10.90	....
St. Louis Park, Minn.	8.35	9.85
Seattle, Wash.	14.50	16.50
Sebewaing, Mich.	10.00	....
Syracuse, N. Y.	14.00	16.00 C/L 20.00 L/C

STATISTICS FOR FEBRUARY AND MARCH

	†February	‡March
Production	1,055,342	805,980
Shipment (rail)	44,000	55,000
Shipments (truck)	1,145,345	1,063,290
Stock on hand	1,377,858	720,574
Unfilled orders	770,000	1,800,000

†Ten plants reporting: incomplete, one not reporting production, three not reporting stock on hand and five not reporting unfilled orders.

‡Nine plants reporting: incomplete, one not reporting production, four not reporting stock on hand, and five not reporting unfilled orders.

Mica Industry Is Thriving

WESTERN NORTH CAROLINA, one of the world's most important mica centers, is anticipating a great pickup in business. The demand for the mineral in manufacturing war materials has already boosted the price and demand. More capital investment in operations in the area is being considered and new, rich veins of mica are being discovered.

Aggregate Rates Revised For Truck Competition

TO MEET truck competition from points not served by railroad, the I.C.C. has given the New York Central and the Wabash Railroads relief from the long-and-short-haul part of the fourth section in establishing to Champaign and Urbana, Ill., single-line interstate rates of 60c a net ton on sand and gravel from Attica and Kern, Ind., and 71c a net ton on sand and gravel from Terre Haute, Ind., and on crushed stone from Greencastle, Ind., and Lehigh, Ill. The relief is given by fourth section order No. 13773 and is to expire five months after the effective date of the rates. The respective present rate are 77c and 88c.

Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of April 13:

Central

61539. **Crushed stone,** C. L. Establish on, from Thornton, Ill., to Beaver City, Brook and Morocco, Ind., 60c net ton.

61550. **Sand** (except industrial), in open equipment, C. L. Establish on, from Vans Siding, Ill., to Indianapolis, Ind., 138c net ton via N. Y. C. (W), Kankakee, Ill., and N. Y. C. (C).

61551. **Crushed stone,** C. L. Establish on, from Monroe, Mich., to Denson, Oak Shade and Ottokee, O., 101c net ton.

61553 (cancels WDA 59127). **Industrial sand,** as per usual descriptions (a), (b) and (c). Establish on, from Canton, O. Group to Oshawa, Ont., (a) 420c; (b) 440c, and (c) 382c net ton.

61579. **Slag,** crude, other than granulated; crushed and screenings, other than granulated; and granulated; not processed. Establish on, from Hamilton, O., to Minster, O., 127c net ton.

61582. **Industrial sand** per usual descriptions (a), (b) and (c). Establish on, from Evansville, Ind., group, viz.: Grand River Road, Stacer, Newburg, Vanada, Briscoe, Yankeetown, Hatfield, Kensington, McCoy, Richland, Sandale, Hardy, Kincaid, Fairview, Feigel, Rockport, Evansville, Patoka, Troy, Tell City, Cannelton and Chrisney, Ind., to Rochester, Ind., (a) 242c, (b) 266c and (c) 237c net ton.

61595. **Lime,** common, hydrated, quick or slaked, C. L. Establish on, from Detroit, Mich., to Lima, O., 14c, min. wt. 30,000 lb., and 11c, min. wt. 50,000 lb.

61608. **Industrial sand,** C. L., as per usual descriptions (a), (b) and (c). Establish on, from Browntown, Wis., to Montague, Mich., (a) 209c, (b) 230c and (c) 187c net ton, via Chicago, Ill., or Milwaukee, Wis., and P. M. Ry.

61610. **Sand,** naturally bonded molding, in all kinds of equipment, and sand (except industrial), in closed equipment, or in open top equipment with tarpaulin or other protective covering, C. L. Established on, from Rockwood, Mich., to Oshawa, Ont., 305c net ton.

61641. **Lime,** common, hydrated, quick or slaked, C. L., in bags, barrels, casks, iron drums or in bulk. Establish on, from Mosher and Ste. Genevieve, Mo., proposed rates as follows:

To	Min. Wt., Lb. 30,000	50,000
Sylvania, Ohio,		
Routes 1, 2, 4.....	21	17
Oberlin, O.,		
Routes 1, 2, 3, 4.....	23	18
Granville, Ohio,		
Routes 1, 2.....	21	17

Route 1—Via M. I., Centralia-I.C.-Mattoon-N. Y. C. (C.).

Route 2—Via M. I.-Salem-C. & E. I.-Shelbyville-N. Y. C. (C.).

Route 3—Via M. I.-Centralia-I. C.-Chicago or Momence-N. Y. C. (W.).

Note 4—Via M. I.-Salem-C. & E. I.-Chicago or Momence-N. Y. C. (W.).

61685. **Crushed stone and crushed stone screenings,** C. L., in open top cars, min. wt. 80 percent of marked capacity of car, except when car is loaded to full cubical or visible capacity actual weight will apply. Establish on, from Wabash, Ind., to various destinations on the G. T. and P. M. Rys. in Mich., as follows: Allegan, 151c; Hamilton, 149c; Lawton, 138c; Wildeys, 134c; Hartford, 129c; Toquin, 134c; So. Haven, 138c; McDonald, 134c; Grand Jct., 134c; Bravo, 140c; Holland, 145c; Waverly, 145c; Hudsonville, 149c; Grandville, 151c; Grand Rapids, 151c; Lakeside, 134c; Bridgman, 129c; Glen Lord, 129c; St. Joseph, 123c; Wallsmith, 123c; Riverside, 129c; Vrooman, 129c; Garden City, 129c; Coloma, 129c; Watervliet, 129c; Hartford, 129c; Edwardsburg, 121c; Cassapolis, 123c; Penn, 123c; Wakelee, 123c; Marcellus, 129c; Chamberlains, 129c; Schoolcraft, 129c; Vicksburg, 134c; Pavilion, 134c; Scotts, 134c; Climax, 138c; Battle Creek, 140c; Penfield, 143c; Bellevue, 145c; Olivett, 145c; Charlotte, 149c; Potterville, 151c; Millett, 151c; Lansing, 154c.

61876 (cancels W.D.A. 61771). **Limestone,** ground or pulverized, unburned, C. L., min. wt. 60,000 lb. Establish on, from Greencastle, Ind., to various pts. in C.F.A. territory, as follows: Akron, O., 259; Ann Arbor, Mich., 237; Ashland, O., 237; Battle Creek, Mich., 226; Buffalo, N. Y., 325; Cadillac, Mich., 281; Canton, O., 259; Carmi, Ill., 182; Chardon, O., 281; Cleveland, O., 259; Columbus, O., 215; Detroit, Mich., 248; Erie, Pa., 303; Fairmont, W. Va., 303; Findlay, O., 215; Flint, Mich., 259; Galesburg, Ill., 226; Hannibal, Mo., 237; Ironton, O., 248; Jackson, Mich., 226; Jeanette, Penn., 303; Joliet, Ill., 193; Kalamazoo, Mich., 215; Louisville, Ky., 182; Marietta, O., 259; Marshall, Mich., 226; Massillon, O., 259; Milwaukee, Wis., 237; Moline, Ill., 237; Muskegon, Mich., 248; Newark, O., 226; Pittsburgh, Penn., 303; Pontiac, Mich., 259; Port Huron, Mich., 270; Racine, Wis., 226; Richmond, Mich., 259; Rockford, Ill., 226; St. Clair, Mich., 270; St. Louis, Mo., 215; Sandusky, O., 237; Sturgis, Mich., 215; Toledo, O., 226; Wadsworth, O., 259; Waukegan, Ill., 215; Willoughby, O., 270; Wyandotte, Mich., 248; Youngstown, O., 281; Bad Axe, Mich., 303; Bay City, Mich., 270; Caseville, Mich., 303; Cassopolis, Mich., 204; Charlotte, Mich., 237; Clifford, Mich., 281; Grand Haven, Mich., 237; Greenville, Mich., 259; Ionia, Mich., 259;

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason: No present or prospective movement.

Note 5—Reason: Comparable with rates from other origins in immediate vicinity.

Note 6—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

Note 7—The oil, tar or asphaltum not to exceed 10% of weight of the commodity shipped, the shipper to so certify on shipping order or bill of lading.

Lapeer, Mich., 270; Owendale, Mich., 292; Owosso, Mich., 259; Pigeon, Mich., 292; Saginaw, Mich., 270; Wixom, Mich., 259.

The above figures are the rates in cents per net ton.

61904. **Sand, all kinds and gravel,** in open top cars, C. L. Establish on, from Rittenours, O., to Copley, O., 160c net ton.

61883. (a) **Sand** (except industrial), and **gravel,** in open top equipment, C. L. (See Note 6). (b) **Sand,** industrial, in all kinds of equipment, C. L.; sand (except industrial), and **gravel,** in closed equipment, C. L. Establish on, from Chardon, O., to the following points in Penn. and W. Va.: Beaver Falls, Penn., (a) 132, (b) 143; Benwood, W. Va., (a) 154, (b) 176; Blawnox, Penn., (a) 143, (b) 165; Buffalo, N. Y., (a) 165, (b) 187; Butler, Penn., (a) *121, (b) 165; Charleston, W. Va., (a) 253, (b) 253; Corning, N. Y., (a) 237, (b) 242; Ellwood City, Penn., (a) *99, (b) 143; Ford City, Penn., (a) 154, (b) 176; Gauley Bridge, W. Va., (a) 275, (b) 275; Girard, Penn., (a) 121, (b) 132; Kenova, W. Va., (a) 264, (b) 264; Kittaning, Penn., (a) 154, (b) 176; McKeesport, Penn., (a) *132, (b) 176; Morgantown, W. Va., (a) 187, (b) 209; New Castle, Penn., (a) *99 (b) 132; North Tonawanda, N. Y., (a) 176, (b) 198; Sharon, Penn., (a) 121, (b) 132; Suspension Bridge, N. Y., (a) 176, (b) 198; Wampum, Penn., (a) 121, (b) 143; Weirton, W. Va., (a) 154, (b) 176; West Homestead, Penn., (a) *132, (b) 176.

The above figures are the rates in cents per net ton.

*Single line basis via B. & O. R. R. direct.

Southern

21658. **Ground phosphate rock,** C. L. Establish 421c gross ton—S. A. L. Ry. Florida mines to Pelham, Ga.

21751. **Phosphatic sand or clay,** C. L. Establish 509c net ton—Brewster, Fla., to Thurmont, Md.

21752. Establish 154c net ton on **sand, gravel, crushed stone and related articles** from Montgomery, Ala., to A. C. L. stations, viz.: Acre, Artesia, Poulan, Sumner, Ty Ty, Taylor's Still and Gibb, Ga.

21961. **Fluorspar,** C. L., min. 100,000 lb. Establish 363c net ton, Cerilean, Crayne, Crider, Fredonia, Marion, Mexico and Princeton, Ky., to Peoria, Ill.

22084. **Sand and gravel,** C. L. Establish 75c net ton, Paducah, Ky., to Dyersburg, Tenn.

22096. Cancel commodity rate of 75c net ton on **stone, limestone, granite or marble, broken, crushed, granulated, ground or pulverized,** C. L., from Sherwood, Tenn., to Chattanooga, Tenn., permitting mileage scale (effective April 30, 1940), to apply.

22063. **Sand and gravel,** C. L. Establish 75c net ton, Spruce Pine, Ala., to Huntsville, Ala.

Amdt. 1 to 21887. This submittal, included in Dkt. 1036, amended to suggest 155c net ton on **crude feldspar,** C. L., min. 80,000 lb., from Ridgeway, Va., and Price, N. C., to Brookneal, Va., instead of 150c net ton.

Southwestern

19631. **Stone, crushed,** Colorado, to Ponca City, Okla. Establish Gainesville, Tex. combination, i.e., $6.05 per ton from Berthoud and Wild's Spur, Colo., and $7.65 per ton from Lyons, Colo., based by using the rate of $4.18 per ton from Berthoud and Wild's Spur, Colo., and $5.78 per ton from Lyons, Colo., per Item 1477-A, Supplement 20, S. W. L. Tariff 14-S, by use of Rule 27, to Gainesville, plus $1.87 per ton distant commodity rate, published in Items 40 and 800, S. W. L. 162-N.

19900. **Chat sand.** Establish rate of $3.50 per ton of 2000 lb., C. L., min. wt. 100,000 lb., from Webb City, Joplin and Waco, Mo., also Galena, Kan., and Picher, Okla., to Chattanooga, Tenn.

19928. **Lime,** common, viz.: Lump, crushed, pulverized or hydrated. Establish rate of 16c per 100 lb., min. wt., 80,000 lb., C. L., in straight or mixed, from Sequiota and Springfield, Mo., to Louisville, Neb., rate to alternate with present rates of 25c per 100 lb., min. wt. 30,000 lb. and 20c per 100 lb., min. wt. 50,000 lb.

20031. **Lime, hydrated,** Berwick, La., to New York, N. Y. ("Morgan Line" Piers). To establish rate of $4.88 per net ton, min. wt. 500 lb., on lime, hydrated, C. L., from Berwick, La., to New York, N. Y.

Trunk

Sup. 3 to 38398. **Limestone, crude, fluxing, foundry and furnace,** in bulk in open top equipment, C. L. (See Note 3), but not less than 80,000 lb., to Worcester, Mass., from Devault, Rambo, Blue Bell, Penn., $3.08, Billmyer, Penn., $3.30, Bellefonte and Pleasant Gap, Penn., $3.52 per net ton (See Note 5).

38598 (Sup. 1). **Sand and gravel** (except industrial), in open top cars, not covered by tarpaulin or other protective covering; sand and gravel other than industrial, in closed cars or in open top cars with tarpaulin or other protective coverings; **industrial sand** in all kinds of equipment (See Note 3), from Perth Amboy, District Stations, N. J., to Smith Falls, Ont., 29c per 100 lb.

38652 (increase). Cancel water competitive commodity rate of 24c per net ton on **waste phosphate rock residue,** C. L., min. wt. 100,000 lb., from Carteret, N. J., to Tremley, N. J., as published in C. R. R. of N. J. PUC-NJ No. 100 (See Note 4).

38663. **Crushed stone** C. L. (See Note 3), from Frederick, Md., to Bedford, Penn., and Manns Choice, Penn., $1.76 per net ton, in lieu of current sixth class rate of $4 per net ton (See Note 5).

38626. **Limestone, crude, fluxing, foundry or furnace,** only when loaded in bulk in open top equipment, C. L., (See Note 3), from Engle, Martinsburg, Millville, W. Va., Stephens City and Capon Road, Va., to Baltimore, Md., $1.28 per gross ton, in lieu of current commodity rate of $1.74 per gross ton (See Note 5).

38636. **Limestone, furnace or fluxing,** C. L., (See Note 3), from Linville, Va., to Baltimore, Md., and Sparrows Point, Md., 136c per gross ton in lieu of current commodity rate of 208c per gross ton (See Note 5).

M-4607 (increase). Cancel Item 3535 of agent Curlett's Tariff I. C. C. A621, covering rate of $5.50 per net ton on **slate, crushed or ground,** C. L., **and stone, chips or granules,** C. L., from Cardiff, Whiteford, Md., Delta and Slate Hill, Penn., to Toronto, Ont. See Note 4, and to conform to the fourth section of the Act.

Texas-Louisiana

4543. **Sand, gravel, crushed stone and common shell.** Establish the following rates as described in Item 430, Texas Lines' Tariff 84-C, from Carley, Victoria, Dittlinger, Ogden and Houston to Hardin:

On sand and gravel (see Note A), from Victoria, $1.30 per net ton; from Carley, $1.20 per net ton.

On crushed stone (see Note A), from Dittlinger and Ogden, $1.60 per net ton.

More About People

(See also page 53)

HUGH A. GALT has retired as vice-president of the Pittsburgh Plate Glass Co. after more than 40 years service with the company and its affiliates. He also relinquished his position as vice-president of the Columbia Cement Division, as general manager of the Columbia Chemical Division and as president of Southern Alkali Corp. He will continue as a director of the Pittsburgh Plate Glass Co., the Cleveland and Pittsburgh railroad and the First-Central Trust Co. of Akron.

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F. T. HANCHETT, long associated with the building materials industry in California, has opened a transit-mixed concrete distribution plant in San Jose. Recently he severed a 19 year connection with a local building material firm and purchased the distribution plant of Martin Brothers, and also their aggregates plant on Tennant Avenue, off the Monterey highway. Mr. Hanchett in 1930 served as president of the Building Material Dealers of Northern California.

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WALTER A. SCHMIDT, president and general manager of Western Precipitation Corp., Los Angeles, Calif., was honored recently at one of a series of banquets given by the National Manufacturers Association with an award of "Modern Pioneer." Harry V. Welch, chief chemist, and Evald Anderson, chief consulting-engineer, of the company were also given awards for achievements in electrical precipitation of suspended matter and for the mechanical cleaning of gases.

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MARLAND S. WOLF, manager of advertising and sales promotion of United States Gypsum Co., will represent it in the Association of National Advertisers, Inc., to which the company has been elected as a member.

OBITUARIES

DAVID S. WILSON, vice-president of the Searington Sand & Gravel Co., Garden City, N. Y., died March 22 at the age of 58.

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WILLIAM R. SMITH, president and general manager of the Lane Construction Corp., Meriden, Conn., and president of the American Road Builders Association in 1931, died April 5 at the age of 72. In 1893 he moved from his birthplace, North Haven, Conn., to Meriden where he entered the crushed stone business and later became an associate of the late John S. Lane, founder of the Lane companies, in charge of the Weehawken, N. J., quarries of the concern and was later made general manager of the Lane Construction Corp.

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H. H. ROBERTSON, superintendent of the Big T plant at Roscoe, Calif., of Consolidated Rock Products Co., died recently. He is succeeded by W. N. Demers, who formerly was a foreman.

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FRANK J. GRUTSCH, vice-president and treasurer of the Concrete Products Mfg. Co., Brentwood, Mo., died April 9 at the age of 65.

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WILLIAM SHADFORD, retired chief engineer of the Ideal Cement Co. plant at Portland, Colo., died March 27. Retiring in 1931, he had been active in the Colorado mining industry from 1900 and for 30 years had been associated with the cement plant at Portland.

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ERWIN O. HATHAWAY, for 30 years with the U. S. Bureau of Public Roads, now the Public Roads Administration, died recently at the age of 72. During much of his time he was stationed at St. Paul.

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ARTHUR B. SMITH, engineer for the Santa Cruz Portland Cement Co., died March 25 in Santa Ana, Calif.

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COL. E. L. ARMSTRONG, well known to phosphate producers in the Tennessee fields, died February 23 at the age of 84.

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GRANBERY JACKSON, one of the early pioneers in the phosphate business at Mt. Pleasant, Tenn., and widely known to the industry for the past 40 years, passed away recently in his 67th year. He was associated in the old Jackson Phosphate Co., was for a while chief engineer of the International Agricultural Corp., and head of the Natural Phosphate Co.

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A. WHITON VENNEMA, mechanical superintendent of the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J., died, March 23 in his 53rd year.

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EDMUND HUGHES, well known figure in phosphate circles, died recently at the age of 85.

New Incorporations

Owensboro Sand and Gravel Co., Owensboro, Ky., has been incorporated by William M. O'Bryan, T. J. Bartlett and Joseph Nall with a capital of $50,000.

Elk River Sand and Slag Co., Charleston, W. Va., has been granted a charter. Capitalized at $25,000, incorporators are J. W. Harman, M. P. Wells and B. B. Board.

River Sand & Gravel Co., Inc., Bronx, N. Y., has been granted a charter with a capital of 200 shares no par value. Agent is Vincent Gilroy, 219 Broadway, New York City.

Valley Builders, Inc., Spring Valley, Ill., has been granted a charter with 200 shares at $100 a share. Incorporators are G. Sitterly, L. C. Sitterly, and H. E. Nelson.

Logan Sand Co., Logan, W. Va., with capitalization of $5000, has been incorporated by Pete C. Minotti, D. H. Jones and S. W. Ferrell.

Muncie Ready Mixed Corp., Muncie, Ind., has filed articles of incorporation with a capital of 100 shares, $100 par value. D. H. Binford, W. G. Morrison and J. F. Gubbins are incorporators.

White River Sand and Gravel Corp., Martinsville, Ind., has been granted a charter. It is capitalized at 100 shares no par value. Incorporators are Raymond F. Dalton, Hazel H. Dalton and Ray Haase.

Westbury Sand and Gravel Corp., Queens, N. Y., has been granted a charter with a capital of 200 shares no par value. Incorporator is Irving Kahn, 160 Hillside Ave., Jamaica, N. Y.

West Texas Stone Co., Lueders, Tex., has been granted a charter. Capital is $30,000 and incorporators are Joseph J. Kell, F. M. Johnson and J. W. Kell.

Manufacturers' News Notes

General Electric Co., Schenectady, N. Y., announces that Robert S. Peare, president and general manager of the Maqua Co., has been named manager of the publicity department of the company. He will succeed Chester H. Lang, who becomes manager of apparatus sales.

F. L. Smidth & Co., New York, N. Y., has moved from 225 Broadway to 60 E. 42nd Street.

Timken Roller Bearing Co., Canton, Ohio, has appointed Yale D. Hills assistant general manager of the service-sales division. He came with the company in 1919 and recently has been supervisor of distributors. J. F. Cornell, manager of the Minneapolis branch, has been made special representative with headquarters at Canton.

Caterpillar Tractor Co., Peoria, Ill., reports that J. D. Fletcher, export sales manager, and T. R. Farley, assistant to the president, have been elected vice-presidents of the company.

Robins Conveying Belt Co. has moved its general offices from New York City to a new building at the site of its factory. A New York office at 70 Pine Street will be maintained within the city.

R. G. LeTourneau, Inc., Peoria, Ill., announces that George C. McNutt has assumed the position of advertising manager to fill the vacancy made by the resignation of George R. Huffman. Mr. McNutt held this position from 1935 until 1937 and since then had been with the Bert S. Gittins Advertising Agency as account executive on Allis-Chalmers, Bucyrus-Erie and other industrial accounts.

George C. McNutt

Chain Belt Co., Milwaukee, Wis., has appointed Thomas E. Corker manager of the Detroit district office to succeed G. A. Gunther. Robert Potter has been transferred from the home office sales organization to the Pittsburgh office.

Link-Belt Speeder Corp., Chicago, Ill., announces the appointment of Hayes Parsons as sales manager. For the past several years he has represented Speeder Machinery Co., and, after the consolidation, Link-Belt Speeder Corp. in the Seattle district.

Diamond Iron Works, Inc., Minneapolis, Minn., has appointed L. E. Cole sales representative for Washington, Oregon, Idaho, Montana, Wyoming, Colorado, Utah, Nevada, California and Alaska. His headquarters will be at the Eastman Bldg. Boise, Idaho.

Wellman Engineering Co., Cleveland, Ohio, has appointed W. C. Swalley as assistant general sales manager.

International Acetylene Association, New York, N. Y., has awarded Otto C. Voss the 1939 James Turner Morehead medal for outstanding work in the production or utilization of calcium carbide and acetylene gas. He is advisory superintendent of the tank and plate shop at Allis-Chalmers Mfg. Co.

Morse Chain Co., Ithaca, N. Y., announces the opening of a new branch office at 1418 Polk St., Houston, Tex. It will be managered by Bob Koch, who for the last five years has been assistant sales manager of the company.

Classified Advertisements

Consider this Consolidated Equipment!

Equipment For Sale at Former Emeralite Rock Products Co., Ely, Minnesota

1—24x36" Jaw Crusher, all steel.
2—8x36" Reduction type Jaw Crushers, Universal.
8—Sets of CRUSHING ROLLS; 5—24x14" Allis-Chalmers Type B; 20x14" Allis-Chalmers Type B; 20x14" Sturtevant; 30x14" Colorado Iron Wks.; 36x16" Sturtevant.
70—ELECTRIC MOTORS, from 1 H.P. to 200 H.P., all 3/60/440 volts, including 2—150 H.P. Slip Ring.
1—Ingersoll-Rand AIR COMPRESSOR, 458 CFM., 100 lb. pressure, size 13x8x12, Imperial Type 10-XRB, two-stage, with inter-cooler, 70 H.P. Westinghouse 3/60/440 Motor.
1—7x6 Type ER-1 Ingersoll-Rand AIR COMPRESSOR, V-belt drive, and 15 H.P. Motor.
1—1¼ yd. OSGOOD ELECTRIC SHOVEL, 21' boom, 16' dipper handles.
3—DIRECT HEAT ROTARY DRYERS: 5x50' Buckeye and 4x30' American Process, oil burners. Also 4x40' Ruggles-Coles.
3—ELECTRIC HUMMER SCREENS, W. S. TYLER CO.; 3x5' No. 33; 4x5' No. 33; all double-deck.
4—3x6' STURTEVANT MOTO-VIBRO SCREENS, double deck, arranged two in battery, side by side.
1—4'x7' LEAHY VIB. SCREEN, double deck, encl.
1—150 Amp. Lincoln ELECTRIC WELDER, portable.
1—No. 5 Ingersoll-Rand DRILL SHARPENER.
8—BUCKET ELEVATORS, various sizes, enclosed.

Also much other equipment, thoroughly described in illustrated circular. Representative, with authority to sell, on the premises. Inquiries addressed to Consolidated Products Co., Inc., P.O. Box 180, Ely, Minn., will bring immediate quotations.

7 Ft. Symons Cone Crusher, Fitted With Fine Bowl for Immediate Shipment at a Large Saving.

SOME SPECIAL ITEMS:

2—No. 55 Raymond Imp Mills, each with 60 H.P. Motor and Separator.
1—No. 40 Raymond Imp Mill with 50 H.P. Motor and 6' Centrifugal Air Separator.
6—4'x7' Leahy Vib. Screens, 2-deck, motor driven.
2—INDIRECT HEAT ROTARY DRYERS, CHRISTIE, 70"x40', 80"x65'.
1—MARION No. 351 CRANE, gas, 4 years old. Used six months.
1—MARION No. 451 ELECTRIC SHOVEL, 3 motor type, 1¾ yd.
2—BROWNING LOCOMOTIVE CRANES No. 8-C, 25 ton capacity, 50' booms.
1—DIESEL POWER UNIT, 60 H.P., Int'l., Model PD-40, complete.
1—BUCYRUS-MONIGHAN No. 6W DIESEL DRAGLINE, 6 yd. bucket, 150' boom.
1—No. 55B BUCYRUS-ERIE DIESEL DRIVEN SHOVEL, 2½ yd.
1—527 CFM GARDNER-DENVER COMPRESSOR, V-belt, Cat. Diesel D-13,000.
1—1300 CFM I-R PRE-2 COMPRESSOR.
1—315 CFM SULLIVAN WT-60 Cat. Diesel, D-13000.
1—CATERPILLAR RD-7 DIESEL TRACTOR with LAPLATE CHOATE BULLDOZER.

We Have Also Purchased and Are Now Liquidating a Complete 1,000,000 Barrel Portland Cement Plant at Castalia, Ohio—60 Miles West of Cleveland

SOME OF THE ITEMS IN THIS PLANT ARE:

8x125', 6x120' and 6x50' ROTARY KILNS.
1—4'6"x50' Direct Heat Rotary Dryer, double shell.
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906 "	24"	5	1/8"	1/32"	"
298 "	24"	4	1/8"	1/16"	"
370 "	22"	8	1/16"	1/16"	Elevator
296 "	22"	8	Friction		"
1455 "	20"	5	1/8"	1/32"	Conveyor
403 "	20"	4	1/8"	1/16"	"
1738 "	18"	4	1/8"	1/32"	"
60 "	18"	8	1/4"	1/16"	Elevator
288 "	18"	6	1/8"	1/16"	"
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1096 "	16"	4	1/8"	1/32"	"
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10 Ton Brownhoist Crane, steam, ¾ yd.....No. 6983
20 Ton Amer. Hoist & Derrick Crane, steam 1½ Yd.No.1115
7" Newhouse Crusher .....No. 8280
Scalper Screen—72" x 12'—Galland Henning.
Washing Screen—40" x 12'—Galland Henning.
6" Fairbanks Morse pump—direct conn. 50 HP motor.
10" CI pipe.
Head and tail pulley assemblies—rollers and idlers.

150 HP Motor	GE	220 V. 3 ph.	600 RPM
50 HP Motor	WEST	220 V. 3 ph.	1120 RPM
50 HP Motor	GE	220 V. 3 ph.	900 RPM
50 HP Motor	GE	220 V. 3 ph.	900 RPM
30 HP Motor	GE	220 V. 3 ph.	1800 RPM
30 HP Motor	GE	220 V. 3 ph.	720 RPM
25 HP Motor	GE	220 V. 3 ph.	720 RPM
15 HP Motor	GE	220 V. 3 ph.	1200 RPM
15 HP Motor	WEST	220 V. 3 ph.	860 RPM
5 HP Motor	GE	220 V. 3 ph.	1200 RPM
5 HP Motor	Allis-Chal.	220 V. 3 ph.	1200 RPM

ALL SUBJECT TO PRIOR SALE

WISCONSIN SAND AND GRAVEL COMPANY

623 NORTH SECOND STREET **MILWAUKEE, WISCONSIN**

FOR SALE

1—Rex 2½-3 yard capacity truck mixer.
3—Ingersoll Rand Size "D" Wagon Drills complete.
1—Midwest 10 ton, 26" gauge locomotive with self starter.
1—Ingersoll Rand Size 8 AFV pump with 60 HP, A.C. 3-phase motor.
1—Ingersoll Rand Size 8 AFV pump with 75 HP, A.C. 3-phase motor.
1—Barber Green Model "N" conveyor gas engine or electric motor.
2—Four ton 36" gauge locomotives.
1—Ingersoll Rand type 34 Drill Sharpener.
1—Sullivan size DR-82 Drill Sharpener.
7—Chicago Pneumatic Model 52 Wet Type Sinker Drills.
1—Ingersoll Rand Size 14 AFV pump with 300 HP, A.C. 3-phase motor.
1—Marion Diesel Electric 1½ cu. yd. shovel.
Also: V shape cars, all sizes, pneumatic tools, generators, drill steel, etc.

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LONG ISLAND CITY, N. Y.

PROMPT DELIVERY

25 ton Plymouth Gasoline Locomotive. New 1932.
25 ton Gasoline Locomotive Cranes, 4'8½" Ga.
1 yd. & 1¼ yd. P & H Cranes & Draglines.
20"x200' Sullivan Troughed Belt Conveyor.
80, 100, 120, 180, 240 HP Fairbanks Morse and Atlas Diesels. Generators if required.
180 HP Fairbanks Morse Dredge type Diesel.
Send for Bulletin 126

MISSISSIPPI VALLEY EQUIPMENT COMPANY
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5—Westinghouse, 75 H.P., 550 Volts, 3 Phase, 60 Cycles, 850 R.P.M. Full Load, Type CCL, Induction Motors, Constant Speed.
3—5'0" x 32'0" Rotary Dryers.

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ELECTRICAL MACHINERY

Motors and Generators, A.C. and D.C., for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

V. M. NUSSBAUM & CO.
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1—8" & 1—12" Swintek Cutter.
12" AMSCO pump dir. conn. elct. motor.
Complete Sauerman cableway, steel mast, elct. hoist, bucket.
8" AMSCO belt driven pump.
250-HP. G. E. motor, base and pulley.
Address Box 945, care of Rock Products, 309 W. Jackson Blvd., Chicago, Ill.

Large Crushing Plant

66 x 84 — JAW CRUSHER

Secondary Crushers—Motors—Disc-crusher—Elec. Hoist—Conveyors—Elevators—Screens—Dust Collectors—Etc.
Box 913, Care of Rock Products, 309 West Jackson Blvd., Chicago, Ill.

New—RAILS—Relaying

ALL SECTIONS
Also contractors' equipment, "V" shaped and Western cars, 24 and 36-in. gauge, portable track, gas locos, frogs and switches. Attractive prices quoted. Wire, write or telephone for quotations.

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480 Lexington Ave. **New York, N. Y.**
28 St. Nicholas Building **Pittsburgh, Pennsylvania**

Unusual Items . . . Unusually Priced!

1—6½-yd. Bucyrus 320-B Electric Shovel
16—20-yd. Magor air operated Dump Cars
12—50-ton Covered Hopper Cars

IRON & STEEL PRODUCTS, INC.
13492 S. Brainard Ave. **Chicago, Ill.**

SYNCH. MOTOR GENERATORS

750 KW WEST.	250 V.	2400 A.C.	900 RPM
300 KW G.E.	250 V.	2300/4000 A.C.	1200 RPM
200 KW G.E.	250 V.	2300/4000 A.C.	1200 RPM
150 KW WEST.	250 V.	2300/4000 A.C.	1200 RPM
100 KW G.E.	250 V.	2300 A.C.	1200 RPM

WALLACE E. KIRK COMPANY
Incorporated
502-F Grant Building **Pittsburgh, Pa.**

LOCOMOTIVE CRANES

OHIO — 25-ton capacity, steam, eight wheel 55 ft. lattice boom. A modern unit.
ORTON—12-15 ton capacity, gasoline powered, eight wheel, 40 ft. or 60 ft. boom.

P. A. HENAULT
2140 Book Bldg. **Detroit, Michigan**

DIESEL OIL ENGINES

All sizes and makes.
Electric Light plants.
Compressors, Contractors Eqpt.
At prices you can afford to pay.

J. D. ANDERSON MCHY. CO.
5516 Maple Ave., St. Louis, Mo.

No. 19 Kennedy, 7" & No. 10 Newhouse.
8A, 8B, 10B, No. 32 & 36" Telsmith.
Nos. 4 & 6 Traylor Gyratory Crushers.
9x30" Telsmith, 11x26" Champion, 14x24" Birdsboro, 15x36" Farrell, 24x36" Carroll, 24x72" & 60x84" Traylor, Jaw Crushers.
30x14", 40x15" & 54x24" Crushing Rolls.
18x42" Stevenson Shingle Roll Crusher.
16, 18, 19 & 21 ton ST 36" Ga. Locomotives.
2 Yd. Atlas—4 Yd. Western 36" ga. Dump cars.
Page 1¾ Yd. Bucyrus Erie 3 & 5 yd. Diesel Electric Draglines.
90 HP Fairbanks Model 34B Diesel Engine.
110 HP Anderson "K" Diesel Engine.
Vibrating Screens—all makes and sizes.
Let us have your inquiries. Ask for Bulletin 49.

MID-CONTINENT EQUIPMENT CO.
710 Eastgate Pa. 2290 St. Louis, Mo.

Used Equipment For Sale

CRANES, SHOVELS & DRAGLINES
1—Osgood, 1 yd. gas. 50' boom, Dragline.
1—Marion 480 electric 70' boom 2 yd. Bucket.
1—P & H 780 electric, 70' boom, 2 yd. Bucket.
1—Lima 601, gas shovel and dragline 1½ yd. capacity.
1—Bucyrus Erie 50B electric shovel, rheostat control.
1—General ⅝ yd. capacity shovel.

TRACTORS
1—Allis Chalmers M-W with hydraulically operated Bulldozer and hydraulically operated Maney 2 yd. scraper.

CRUSHERS
Gyratory Crushers—Size Nos. 3-5-6-7½-8-10 and 21 with openings 8" x 30" up to 42" x 134". All standard makes.

JAW CRUSHERS
Jaw Crushers with openings 8" x 16" up to 48" x 60". All standard makes.

ROLL CRUSHERS
2—Allis Chalmers and Traylor 16 x 36 and 18 x 36.

LIVE ROLL GRIZZLEY
1—Robbins live roll grizzley Type S. Model 7-36-12, opening 3½".

REDUCTION CRUSHERS
1—Kennedy, Model 25.
1—Telsmith 3' cone crusher.

COMPRESSORS
1—Ingersoll Rand XCB, 15 x 9¼ x 12, 676' capacity, 100 H.P., AC Motor, short belt drive.
1—Chic-Pneu., NSE, 13 x 8, low pressure, 360' capacity.

DIESEL ENGINES
1—450 H.P. Cooper Bessemer, 4 cylinder, 4 cycle, solid injection, 225 R.P.M. with or without rope drive generator, 3 phase, 60 cycle, 2200 volt, complete with all auxiliary equipment.
1—Same as above with direct connected generator.
1—110 H.P. 75 KW, AC Generator.
1—120 H.P., horizontal, 2 cylinder, 350 R.P.M.
1—120 H.P., Waukesha gasoline, complete with clutch, all mounted on steel frame.

HOISTS
1—Single drum mine Hoist, drum 86" x 76" with 350 H.P. AC Motor.
1—National 3 drum with Swinger attached with or without 60 H.P. Waukesha Motor.

DRYERS
1—6' x 60' single shell, new condition.
1—5' x 36' double shell, new condition.

PULVERIZERS
1—Jeffrey 24" x 36" Hammer Mill, type B manganese fitted.
1—Sturtevant No. 1 and one No. 2 Ring Roll Mill.
1—Raymond 0000-C.

AIR SEPARATOR
1—Raymond 10' with motor V-belt drive.

SCREENS
1—New Holland, single deck, 2 x 6.
1—Link Belt, single deck, 3 x 5.
1—Jeffrey, single deck, 4 x 7.
1—Robbins, 2 deck, heavy scalping screen, 4 x 10.
2—Telsmith 4 x 10 double deck, heavy duty.

LOCOMOTIVES, STD. R. R. GAUGE
2—Vulcan 55 ton, steam, power reverse, Nat. Board Boiler, 200 lbs. working pressure, air brakes, 27,800 lbs. tractive effort, built 1933, used 10 months.
1—Baldwin ten wheel, steam with tender, cylinders 18 x 24, built in 1930.
1—American 40 ton, 4 wheel Saddle Tank.
1—Vulcan 25 ton, 4 wheel Saddle Tank.
1—Heisler 42 ton, steam, geared, Loco.
2—Plymouth ten ton, gasoline Locos.
1—Plymouth 25 ton, air brakes.

LOCOMOTIVES, NARROW GAUGE
3—Plymouth & Whitcomb 3 ton and 7½ ton, 24" gauge.
6—Plymouth, Vulcan and Whitcomb 7-10- and 14 ton, 36" gauge.
1—Vulcan 45 ton, steam, 36" gauge.
1—Heisler 42 ton, geared Loco. 36" gauge.

Modern Equipment for Contractors and Quarries

A. J. O'NEILL
Lansdowne Theatre Bldg.
Lansdowne, Pa.
Phila. Phone: Madison 7578

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8 Miles of 20 Lb. Used 24 Gauge Steel Track with Steel Ties, 15 Ft. Lengths. Four 8 Ton Plymouth Gas Locomotives, 100 Batch Cars.

JOS. GREENSPON'S SON PIPE CORP.
National Stock Yards (St. Clair Co.), Ill.

Try a Classified Ad IT PAYS

CRUSHERS

GYRATORY: 42" McCully with 80% brand new parts. 36" Allis-C. 20" Super. McCully conv. to 16". Gates Nos. 10, 9, 8, 7½, 6, 5, 4, 3, 2, 1 (75 avail.) Telsmith Nos. 4, 5, 6, 8C, 9 & 16. Also Many Austins, Kennedys and Traylors, many sizes.
JAW TYPE: Traylor 60x84, 48x60, 42x43, 24x72. Superior 84x86 & 24x36. Buchanan 30x42. Farrel 60x42, 30x36, 24x36, 18x36, 12x24. Good Roads 1030. Acme 24x40. Misc. 7x12, 9x16, 8x20, 8x24, 12x24, 9x36, 9x36, 15x36.
REDUC. TYPE: Kennedy Nos. 25, 27 & 49. Telsmith 3-F & 40. Traylor 36" TE, 6", 10", 12" Super. McCully 6" & 10", Newhouse 5, 7 & 10". Symons Cone & Disc Ty. 2' to 4'.
ROLLS: Allis-C. 12½x12, 36x16, 40x15, 54x24 & 72x30. Fairmount 36x60 & Jeffrey 24x24 to 36x54 single roll. Cornish 36x14 & 42x16. Etc., Etc.
HAMMERMILLS: Williams No. 1, 2, 3, 4, 8 & 9. Jeffrey 36x18 & 36x42. Day Nos. 20 & 40, Etc.
MILLS: Kennedy Ball 4x6, 5x6 & 5x8. Marcy 8x6 & 10x9. Hardinge 6'x3', 8'x30" & 6'x9'. Misc. Tube Mills 5' & 6' x 22'. Sturtevant Ring Roll. Raymonds, Kents, Fuller-Lehigh, Etc., Etc.
CRUSHING PLANTS: No. 65 Diamond. No. 22 Pioneer 8x24. 1030 Good Roads, 9x40 Austin-Western, 9x36 C.R.

MISCELLANEOUS ITEMS
Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryers, Derricks, Draglines, Drag Scrapers, Dredges, Drills, Engines, Elevators, Excavators, Generators, Hoists, Kilns, Locomotives, Loaders, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, Etc., in many sizes, types and makes at low prices. (I have equipment at many points in the United States and Canada. What you need may be near your plant.)

ALEXANDER T. McLEOD
7229 Rogers Avenue CHICAGO

Concrete Products Equipment for Sale

FOR SALE

We handle new and rebuilt U. S. Champion Roofing Tile Machinery for profitable production of our French and Spanish Concrete Tile Roofing. Write us for particulars and prices.

L. HANSEN COMPANY
2311 East 48th Terrace, Kansas City, Mo.

Used Equipment Wanted

WANTED TO BUY

Sturtevant Mill or Medium Size Hardinge Mill. Give best cash price and particulars.

YORK STONE AND SUPPLY CO.
YORK, PA.

WANTED

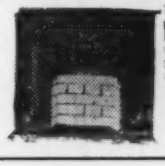
Good used equipment for production of Cement Man-hole Blocks. What have you?

P. O. Box No. 282
Shelbyville, Ind.

MAKE YOUR WANTS KNOWN

ROCK PRODUCTS is the business journal of the rock products industry, its readers are men of influence, and their buying power is big. An advertisement in this classified department will be seen and read. Make your wants known and see how quickly they will be satisfied.

Business Opportunities



Ready Built Fireplace Manufacturing business for sale. Established 12 years, money maker. $5,500 cash.

ADVANCE FIREPLACES
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FOR SALE
Artisan Mold Works

Shop and Home, extra lot. Get in business for yourself. 30 years in business. 531 James St., Elkhart, Indiana.

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Up to 5000 Acres of Tennessee
PHOSPHATE LANDS
Mineral Rights or Fee Simple
BEST AND SAFEST PLACE TO INVEST IDLE MONEY

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WE LOOK INTO THE EARTH

By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

F. M. WELCH ENGINEERING SERVICE
Consulting Engineers Greenville, Ohio
Designers of GRAVEL PLANTS for 30 years
SMALL PLANTS to meet local conditions with flexibility, ample crushing, minimum labor, low first cost and maintenance.
LARGE MODERN PLANTS for metropolitan areas.
GROUND STORAGE Plants.
OLD PLANTS modernized.
CONSULTATION REPORTS

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DIAMOND CORE DRILLING
HOFFMAN BROS. DRILLING COMPANY
PUNXSUTAWNEY, PA.

We drill for any mineral. We have more than forty steam, electric and gasoline drills, adapted for any job. Satisfactory cores guaranteed. Our prices are right.
Established 1902 - - - - Telephone No. 382

H. J. BROWN
CONSULTING ENGINEER
35 Doane Street Boston, Massachusetts
Specializing in Gypsum Plants and in the Mining, Quarrying and Manufacture of Gypsum Products.

Consultation Design
Examinations Construction
Reports Supervision

Positions Wanted

POSITION WANTED—WITHIN NEXT six months. Experienced plant manager with thorough knowledge of open and underground quarries, lime burning, shaft kilns, hydration, cost and maintenance. Successful record of handling labor. State salary. Address Box 946, care of Rock Products, 309 West Jackson Blvd., Chicago, Ill.

POSITION WANTED BY GRADUATE Chemical Engineer, with seven years experience in the Portland Cement Industry. Experienced in operation, laboratory or sales-service work. Address Box 941, Care of Rock Products, 309 West Jackson Blvd., Chicago, Illinois.

Position Vacant

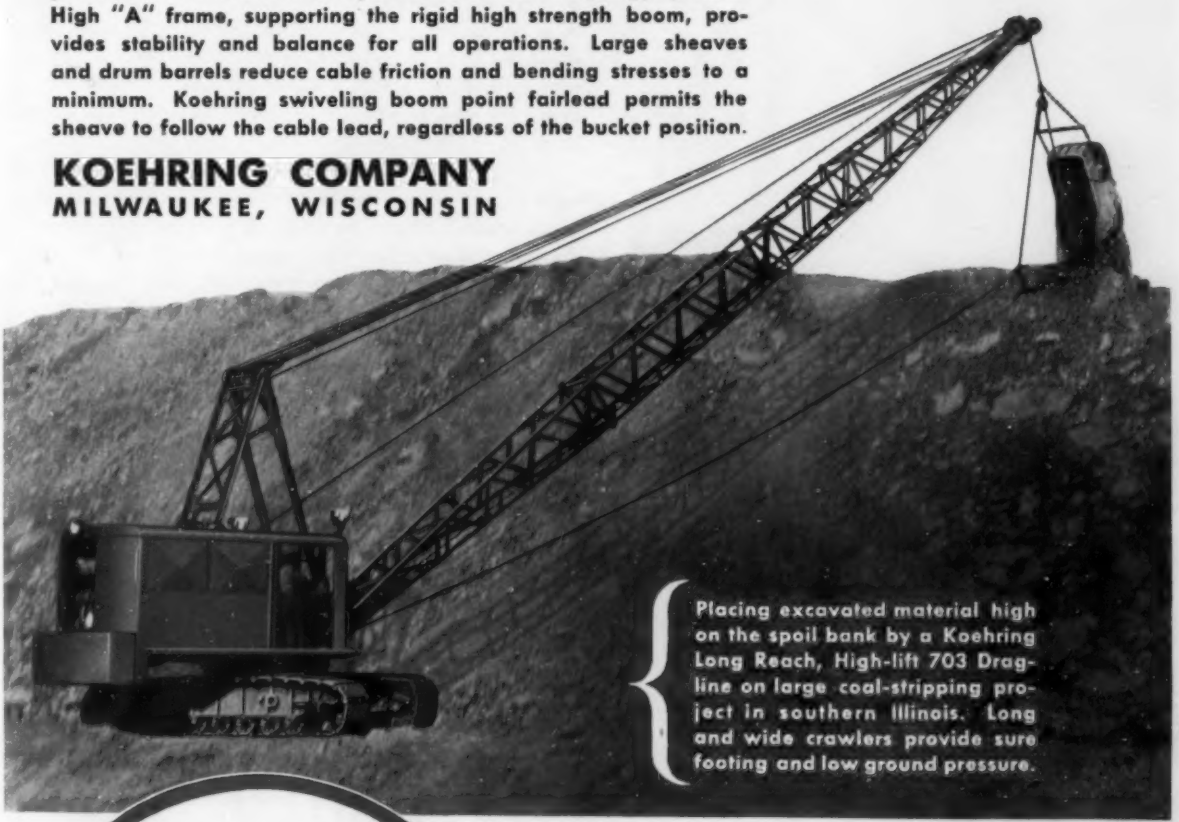
ENGINEER WANTED. SOUND MEdium sized equipment manufacturer wants sales or field engineer experienced in crushing, grinding, pulverizing fields. Fine opening for trained and ambitious man. Reply fully. Box 944, Care of Rock Products, 309 West Jackson Blvd., Chicago, Illinois.

Index to Advertisers

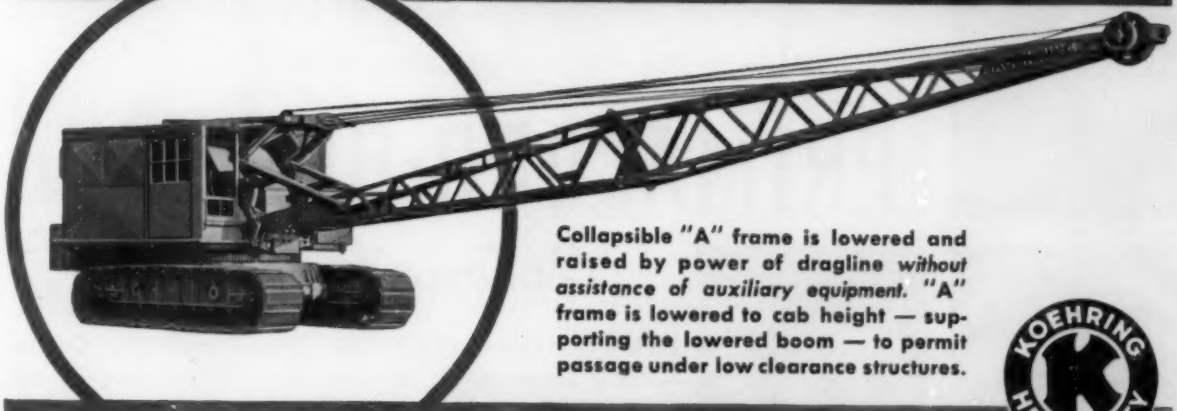
LONG REACH ★ HIGH LIFT FOR LOW COST STRIPPING

Extra long reach and high lift **of Koehring 703 — 803 Dragline-Cranes, reduce the number of moves on large stripping projects. Overburden material can be placed in high and wide spoil banks, safely away from the excavation. Large and wide crawlers provide a substantial footing and low ground pressure — for travel and operation on soft or spongy ground. High "A" frame, supporting the rigid high strength boom, provides stability and balance for all operations. Large sheaves and drum barrels reduce cable friction and bending stresses to a minimum. Koehring swiveling boom point fairlead permits the sheave to follow the cable lead, regardless of the bucket position.**

KOEHRING COMPANY
MILWAUKEE, WISCONSIN



Placing excavated material high on the spoil bank by a Koehring Long Reach, High-lift 703 Dragline on large coal-stripping project in southern Illinois. Long and wide crawlers provide sure footing and low ground pressure.



Collapsible "A" frame is lowered and raised by power of dragline *without assistance of auxiliary equipment.* "A" frame is lowered to cab height — supporting the lowered boom — to permit passage under low clearance structures.

HEAVY-DUTY CONSTRUCTION EQUIPMENT

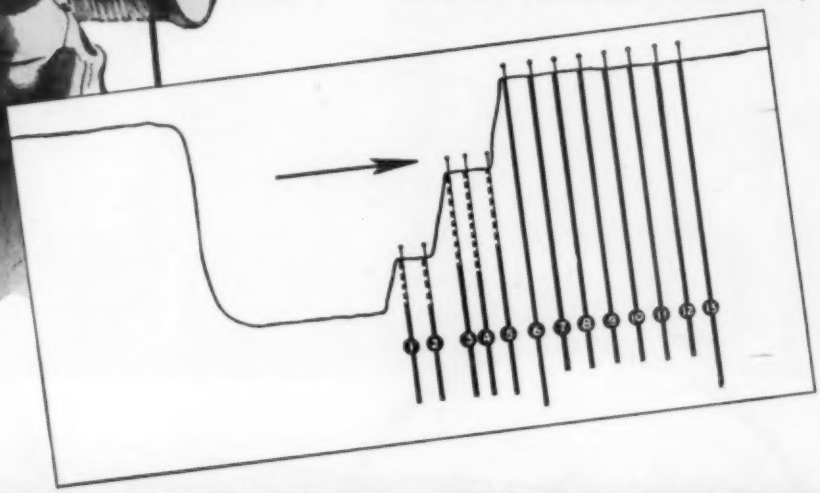
KOEHRING HEAVY DUTY

Bigger AND fewer SHOTS

GIANT blasts are saving money for quarry and open pit operators—in time, in labor, in the moving of equipment. 10 holes—even 4000 holes!—are all in the day's work for PRIMACORD-BICKFORD Detonating Fuse. There's no limit to the depth of the holes or the intricacy of the hookup.

The powerful detonating wave travels Primacord at more than 3 miles per second. It reaches every cartridge in the column, exploding it directly. Primacord detonates the entire blast practically instantaneously, but the split-second time delay between holes and rows, provides the necessary relief of burden.

The giant blast with Primacord permits you to keep equipment on the job until all drilling and loading is finished. *That* alone saves considerable time and money.



PRIMACORD·BICKFORD

Detonating FUSE

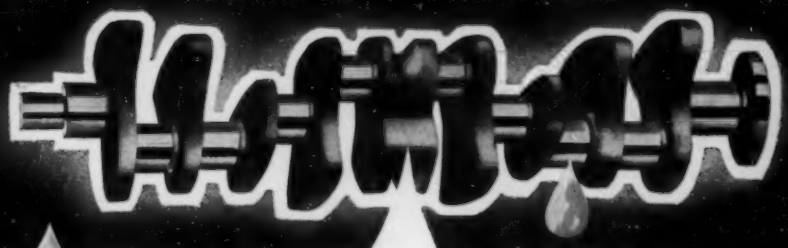
THE ENSIGN-BICKFORD CO., Simsbury, Conn.

Makers of Cordeau-Bickford Detonating Fuse—and Safety Fuse since 1836

PB20

1. Tie through cartridge.
2. Half hitch branch to main line.
3. Connect main line lengths with square knot.
4. Fuse and cap on end of main line.

Would you lubricate the bearings?



Then Lubricate WIRE ROPE!

(IT HAS A THOUSAND "BEARINGS" PER FOOT)

A wire rope is a machine and should be so treated. Every component wire bears upon its adjacent wires and in operation they slide and rub against each other. Just as the crank-shaft bearings in your automobile need lubrication, so do these multiple bearing pressures in wire rope.

A penetrating wire rope lubricant properly applied forms a film even on the inner wires and keeps those invisible "bearings" from wearing or corroding. It adds greatly to the life of your ropes, drums and sheaves, and contributes materially to rope safety.

TRU-LAY Preformed rope and the proper lubricant are a perfect team to obtain maximum rope service and economy.

An American Cable Division representative will gladly assist you with your lubrication or other rope problems.

AMERICAN CABLE DIVISION
WILKES-BARRE, PENNSYLVANIA
In Business for Your Safety

District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles
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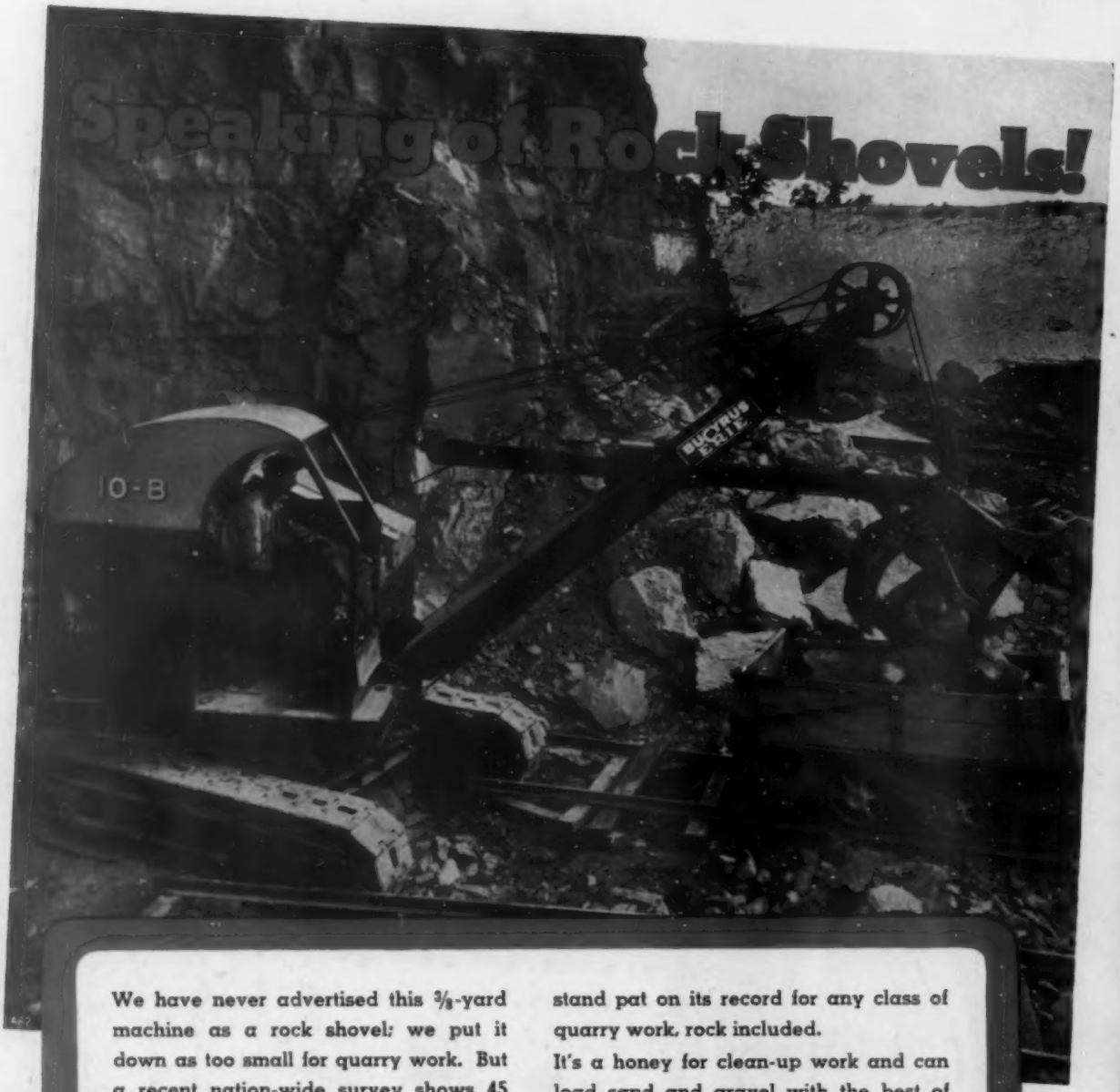
GREEN SIGNIFIES SAFETY

AMERICAN CHAIN & CABLE COMPANY, Inc.

Speaking of Rock Shovels!



We have never advertised this ⅜-yard machine as a rock shovel; we put it down as too small for quarry work. But a recent nation-wide survey shows 45 per cent of the 10-B's in the United States digging rock, standing up to their work and turning out an average of 38 yards an hour. Sure! We were both surprised and pleased!

While we still decline to advertise a ⅜-yard machine as a Bucyrus-Erie rock shovel, we are proud to let the little 10-B stand pat on its record for any class of quarry work, rock included.

It's a honey for clean-up work and can load sand and gravel with the best of them, and it can do a sweet job of road building, drainage or stock piling. Its versatility and its performance have made it the fastest selling excavator in the world.

Ask us to show you what owners report about it; ask us to show you how it can fit into your picture.

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN